SPEKTRA: Jurnal Kajian Pendidikan Sains
Vol. 10, No. 2, 2024, pp. 259-267
ISSN: 2548-642X, DOI:10.32699/spektra.v10i2.7795

EFFECTIVENESS OF TEAM GAME TOUR APPLICATION OF CONTEXTUALISED ELECTRICITY KIT ON DYNAMIC ELECTRICITY MATERIAL TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS

Fakhruddin Z[1], Atthahiriyah Salsabila[2], Syahril[3]
[1,2,3]Physics education, Faculty of Teacher Training and Education, University of Riau, Pekanbaru, Indonesia

Article Info

Article history:
Received 31/07/2024
Accepted 30/09/2024
Published 15/10/2024

Keywords:
Contextual Electrical KIT;
Critical Thinking Skills;

ABSTRACT

In the 4.0 industrial revolution, students need to be able to think critically in order to keep up with the speed at which technology is developing. The purpose of this study is to compare students' critical thinking abilities in lessons using contextualized electrical KIT versus those using regular learning methods. A quasi-experiment with a control group limited to the post-test was the study methodology employed. This study used a sample of 73 students from experimental and control courses at SMP Negeri 23 Pekanbaru. Up to 10 items from the critical thinking ability post-test were used as the data gathering method. Learning using contextual electrical KIT makes students more interested in conducting experiments, because the appearance is more attractive and better known to students in everyday life. The findings demonstrated that the experimental class's average critical thinking abilities outperformed the control class's in every indication in terms of percentage of achievement. The experimental class's average percentage of achievement fell into the moderate group at 59.0%, whereas the control class's percentage fell into the bad category at 46.7%. The use of contextual electrical KIT provides students with experience in studying dynamic electrical material according to real life situations so that it can improve students' critical thinking skills to solve problems related to dynamic electrical material in everyday life.

Corresponding Author:
Fakhruddin Z.
Physiscs Education, Faculty of Teacher Traning and Education, University of Riau, Pekanbaru, Indonesia
Email: fakhruddin.z@lecturer.unri.ac.id

1. INTRODUCTION

The caliber of a country's human resources is inextricably linked to its progress. For both individuals and organizations, education plays a critical role in raising the caliber of human resources. A deliberate and planned effort to create a learning environment in which students actively develop their potential to have the intelligence, noble character, self-control, personality, religious and spiritual strength, and other skills that they will need for themselves and society is what Law No. 20 of 2003, which governs the education system, defines as education (Pristiwanti et al., 2022). Learning is an activity or interaction that produces character, further develops abilities, cognition, and behavior (Hartono et al., 2023). In the meantime, learning encompasses all methods of the learning process activities in which students can influence one another during

teaching and learning activities and teachers can impart knowledge in a sequential manner, all with the aim of achieving the desired outcomes of the learning environment and the causes of positive changes (Sartika et al., 2022).

The rapid advancement of technology, which creates new obstacles for 21st-century learning where people must possess both technological know-how and critical thinking abilities, is what defines the industrial revolution 4.0. Learning and innovation skills 4C, which are composed of four components—creativity, cooperation and teamwork, communication, and critical thinking—are among the necessary abilities (Parwati et al., 2020). Students are expected to use logical thinking in society and everyday life as a result of their education in order to tackle challenges that will arise in the twenty-first century (Pratiwi et., 2019).

Critical thinking is one of the skills that students must have to be able to face competition and challenges in the 21st-century. The capacity to assess the veracity of the information gathered and determine if it can be trusted is known as critical thinking. The capacity for critical analysis is the ability to carefully evaluate the information at hand and to think thoroughly and objectively about it in order to determine the best course of action (Suriati et al., 2021). According to Ennis in Wayudi et al., (2020), there are five markers of critical thinking ability: giving straightforward explanations, developing fundamental abilities, drawing conclusions, offering additional explanations, and planning strategies and tactics. Students need to develop their critical thinking skills because, given the right guidance, they can solve mathematics issues when presented with an issue (Anita & Firmansyah, 2022). The ability of pupils to think critically is crucial because it will influence their everyday activities and help them develop the kind of reasoning that leads to effective learning. In 2021, Syafitri et al. But according to research on how students' critical thinking abilities relate to material classification and how those changes manifest in five indicators, the average achievement percentage is 35.2%, indicating that students' critical thinking abilities remain in the low range (Ridho et al., 2020).

Students' critical thinking abilities can be improved through appropriate learning processes. The issue with learning implementation is that students' critical thinking abilities are not fully developed because learning activities are still centered on the teacher (Firdaus et al., 2019). With the assistance of teachers, students can actively search for, find, and apply their information to acquire learning ideas in an effective learning process (Sinaga & Silaban, 2020). Furthermore, a problem that arises in the field of education, particularly in science subjects, is that learning activities do not motivate students to discover information on their own. As a result, students are unable to offer solutions to problems that come up, particularly those that are connected to science concepts (Cianda et al., 2019).

The goal of science education is to enhance students' data production, problem-solving, and real-world thinking abilities. The full potential of science education will be realized when students are able to become experts in their fields, develop critical, analytical, and creative thinking skills, solve problems, excel in technological advancements, and adapt to long-term changes and advancements (Rini et al., 2021). Therefore, learning that connects material and real life environments is very necessary because it can improve analysis and conclude experimental data (Arif & Velayati, 2024). The scientific approach is one of the models and methods used in the teaching and learning process to engage students in active learning. Through a number of processes that include observing activities to identify problems, solve problems, suggest hypotheses, gather information, generate conclusions, and explain them, the scientific approach is made to make it

easy for students to develop concepts, laws, or principles (Elvianasti et al., 2021). The term "scientific approach" refers to a scientific method that can stimulate morality and religious values as well as cognitive, social, and emotional growth in line with children's developmental principles (Yunita et al., 2019).

Science is abstract so learning media are necessary to assist concretize these abstractions according to the abilities of students who are still operationally concrete (Tri Wulandari & Adam Mudinillah, 2022). According to Atsani (2020), media is everything that can be utilized to transmit messages from the sender to the recipient. This allows for the creation of relevant learning activities by stimulating students' thoughts, emotions, and interests. Learning media serve as a platform for information to be forwarded and disseminated to recipients, resulting in the creation of an organized, effective, and comfortable learning environment that facilitates comprehension of the subject matter and heightens student motivation in studying (Ichsan Mahardika et al., 2021).

The result of research conducted by Ariama & Adrin Burhendi (2022) show that one of the science learning materials that needs to be developed is dynamic electricity material because students still have difficulty understanding the material and there is a lack of development of learning media in this material. This research also shows that the use of learning media can helps students understand physics lessons, especially dynamic electricity material. One of the learning media that can be used is electrical KIT. Electrical KIT is a learning resource that may be utilized with dynamic electrical material. The KIT (Integrated Instrument Component) is a collection of tools designed to support teachers in using their lessons as a medium or instrument to accomplish curriculum-aligned learning objectives and to encourage student learning achievement in a dynamic, imaginative, and meaningful setting (Abdjul & Uloli, 2020). In order to encourage students' interest in learning science, the electricity KIT used in this study is made to be as close to the real world as possible. This allows it to impact contextual learning, where students are guided to draw connections between the knowledge they have and its application in daily life.

2. METHOD

Quasi-experimental study with a post-test only control group design is the methodology employed. Two sample groups—an experimental group and a control group—are used in a quasi-experiment, also known as a quasi-experiment (Hasanah et al., 2018). This study employed a post-test only control group design, meaning that the experimental group received therapy before the test was administered, whereas the control group did not receive treatment. The post-test questions given to both classes were the same, with the same number and time to complete the questions, so it was known the differences in critical thinking abilities possessed by the experimental class and the control class.

The study's participants comprised 288 students from 8 classes at SMP Negeri 23 Pekanbaru who were enrolled in the ninth grade during the 2023–2024 academic year. This study only included 73 students from 2 classes. The previous material test findings were examined utilizing the normalcy and homogeneity tests as a foundation for sampling before dynamic electricity learning could start. The experimental class and the control class were chosen by a simple random sampling technique.

This study's method of gathering data involved giving students a written test or post-test on their critical thinking abilities. Critical thinking skills post-test questions for the experimental

and control classes make up the data gathering tool. The five indicators that Ennis proposed and which Wayudi et al., (2020) cited will be referenced in the post-test questions. These indicators are: giving brief explanations; developing fundamental abilities; drawing conclusions; giving more explanations; and planning strategies and tactics. Two questions per indication were used by the researchers as the number of question items. This study used the independent T-test as a hypothesis test.

The critical thinking competency of the students is represented by the clustering of critical thinking abilities based on student scores shown in Table 1 (Pratiwi in Rahayu & Alyani, 2020).

Table 1. Category of Student Critical Thinking Ability Test Score

Value Range	Category
$80 \leq x \leq 100$	Very good
$66 \leq x \leq 79$	Good
$56 \leq x \leq 65$	Medium
$40 \leq x \leq 55$	Deficient
$0 \leq x \leq 39$	Very Poor

3. RESULTS

Following science instruction using contextual electrical KIT based on renewable energy in class IX.H and traditional learning in class IX.G, descriptive analysis is used to describe the critical thinking abilities of students in classes IX.G and IX.H SMP Negeri 23 Pekanbaru. Table 2 displays the descriptive analysis's findings.

Table 2. Students' Critical Thinking Ability on Each Indicator

No.	Indicators	Experiment Class		Control Class	
		Class Average	Category	Class Average	Category
1.	Provides a simple explanation	60,5	Medium	53,0	Less
2.	Building basic skills	62,0	Medium	43,0	Less
3.	Making inferences	51,0	Less	41,5	Less
4.	Making further explanations	80,0	Very good	57,0	Medium
5.	Organising strategies and tactics	41,5	Less	39,0	Very less
	Class Average	59,0	Medium	46,7	Less

Table 2 shows that the experimental class's average percentage is higher than the control class's. The experimental class using contextualized electrical KIT based on renewable energy has an average of 59.0 with a medium category, while the control class using traditional learning has an average of 46.7 with a less category.

The findings of the independent t-test test, which was conducted for hypothesis testing with the assistance of the SPSS version 27 application, showed that the average difference between the two classes is 12.523, and the significance result was $p = 0.019$ with a 95% confidence level. To find out if there is a substantial difference between classes that utilize contextual power KIT based on renewable energy and classes that use traditional techniques, hypothesis testing is done. Based on the independent t-test that was run to test the H0 hypothesis, the post test results of the independent t-test output are $t = 2.393$, with a significant value of $p = 0.019$. H0 is considered to

be rejected and H1 to be accepted when the data satisfy the independent t-test test conclusion conditions and the p-value is less than 0.05. This suggests that there is a significant difference between the experimental class and the control class's critical thinking abilities after employing contextual electrical KIT based on renewable energy on dynamic electricity.

4. DISCUSSION

Figure 1 displays the findings of data analysis about critical thinking abilities based on five indicators comparing experimental and control courses.

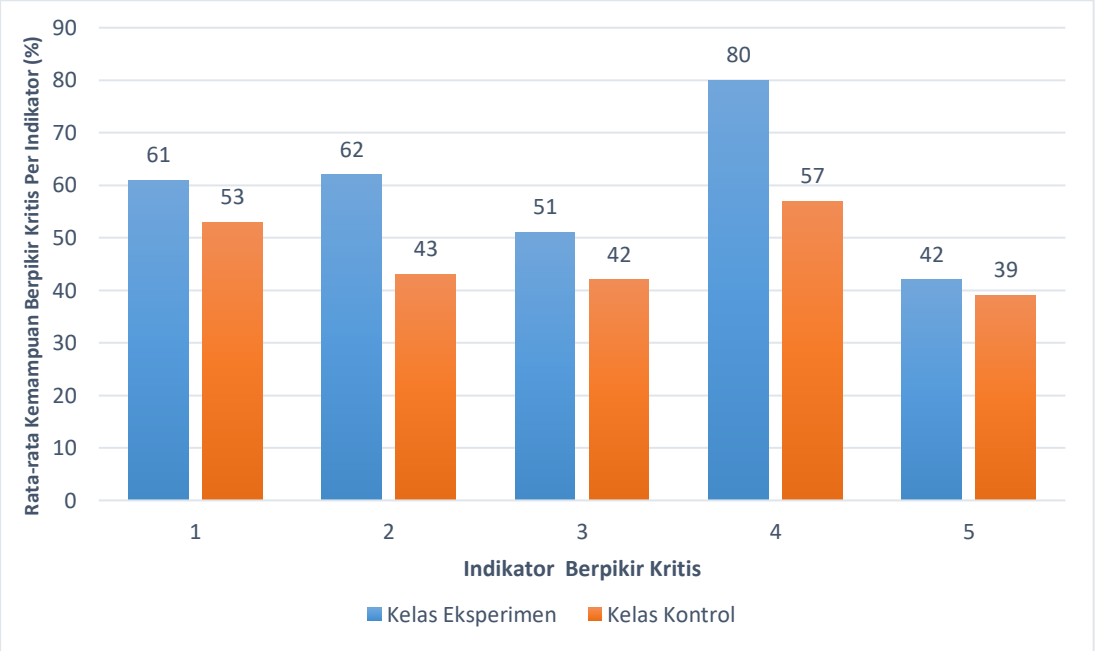

Figure 1. Comparison Chart of Average Values of Critical Thinking Ability Level for Each Indicator

Figure 1 demonstrates that, on average, students in the experimental class were able to think more critically than those in the control class on each subject. The following provides more context for how students' critical thinking abilities relate to each indicator:

3.1 Provide a Simple Explanation

Researchers put pupils to the test on their ability to sum up the electrical circuits that power traffic lights in a few sentences. According to the test findings, the experimental class, which was in the medium group, had an average critical thinking ability of 61%, while the control class, which was in the bad category, had an average critical thinking capacity of 53%. In order to help students better understand a concept, contextual electrical KIT application in dynamic electricity learning might offer a summary of real-world scenarios. In accordance with research conducted by Ridho et al., (2020: 12) that a deeper understanding of a concept is needed and providing examples of phenomena in a concept so that students can compare existing phenomena and provide a basic explanation of these phenomena.

3.2 Building Basic Skills

Researchers analyzed students' abilities in determining the correct energy changes in alternative energy. Based on these inquiries, it was discovered that the experimental class's average critical thinking ability on the basic skills building indicator was 62%, falling into the moderate category, while the control class's average critical thinking ability was 43%, falling into the poor category. According to these results, students in the experimental class had higher critical thinking skills than students in the control group when it comes to fundamental skill development assessments. Classes that implement contextual electricity KIT have a higher percentage of achievement because when learning alternative energy, students can see and carry out experiments directly related to energy changes that occur when using alternative energy in life.

3.3 Drawing Conclusions

Researchers tested students' ability to hypothesize various series of images. Students are asked to identify the circuit with the largest and smallest current strength. According to the exam findings, students' average critical thinking skills on the indicator of forming conclusions were 42% in the questions from the control class and 51% in the experimental class, both of which fell into the poor group. The average achievement of both classrooms indicates that students' critical thinking abilities in the experimental class are superior to those in the control class, even though students' critical thinking skills in drawing conclusions are still insufficient in both classes. The use of contextual electrical KIT in learning can help students understand the characteristics of various electrical circuits. In learning activities, students are directed to measure the current and voltage and determine their relationship to the resistance in each circuit.

3.4 Making Further Explanations

Researchers tested students' ability to pay attention to and evaluate the truth of the facts presented in relation to their understanding of Ohm's law. Based on these inquiries, the experimental class's average critical thinking ability on the indicator of offering more explanation is 80%, placing it in the very good group, whereas the control class's average critical thinking ability is 57%, placing it in the medium category. Classes that apply contextual electrical KIT have a higher percentage of achievement because when learning using contextual electrical KIT students are directed to measure the magnitude of current, voltage and resistance of a circuit. In this way, students can discover for themselves the relationship between current strength, voltage, and resistance in a circuit so that students can more easily understand concepts related to Ohm's law.

3.5 Organising Strategy and Tactics

Researchers tested students' ability to choose the best method for determining the replacement resistance of an electrical circuit. These questions revealed that the experimental class's average critical thinking skill on control strategy and tactics indicators was 42% in the poor group, compared to 39% in the very bad category for the control class. These results show that the

experimental class students' critical thinking skills exceeded the control group's critical thinking skills when it came to measuring organizing methods and techniques. In this question, the treatment given to both classes is the same because the questions given are not related to the contextual electrical KIT that is applied. According to research by Ridho et al., (2020), students' poor conceptual understanding is the reason behind their inability to select a course of action and set criteria as a solution to a problem. Students hesitate to choose the best course of action when it comes to tackling the challenges posed in the questions because they do not fully understand the concepts associated with the content being studied.

5. CONCLUSION

The use of contextual electrical KIT in dynamic electrical learning helps SMP Negeri 23 Pekanbaru class IX students' critical thinking abilities. The post test results of the class that applied contextual electrical KIT in learning had an average of 59 in the medium category. This result is better than the average for classes that do not implement contextual electrical KIT, namely 46.7 in the poor category. Apart from that, there are 27% of students with post test results in the very good category in the class that applies the contextual electricity KIT, while in the class that does not apply the contextual electricity KIT only 11% of students are in the very good category. So it can be concluded that students' critical thinking abilities increase by applying contextual electricity KIT in dynamic electricity learning.

REFERENCES

Abdjul, T., & Uloli, R. (2020). Peningkatan Kreativitas Siswa Melalui Penggunaan KIT IPA Pada Pembelajaran Fisika. *Jambura Physics Journal*, *1*(2), 65–77. https://doi.org/10.34312/jpj.v1i2.5382

Anita, & Firmansyah, D. (2022). Analisis Kemampuan Berpikir Kritis Matematis Siswa SMA Pada Materi Barisan Aritmatika. *Jurnal Matematika Ilmiah*, *8*(1), 30–44. https://doi.org/10.33222/jumlahku.v8i1.1680

Ariama, S., & Adrin Burhendi, F. C. (2022). Pengembangan Website Sebagai Media Pembelajaran Fisika Berbasis Augmented Reality Dengan Menggunakan Metode Marker Based Tracking Pada Materi Listrik Dinamis. *Jurnal Penelitian Pembelajaran Fisika*, *13*(2), 181–190. https://doi.org/10.26877/jp2f.v13i2.12132

Arif, S., & Velayati, J. M. (2024). Perbandingan Kemampuan Berpikir Kritis Siswa Menggunakan Problem Based Learning dan Contextual Teaching and Learning. *SPEKTRA: Jurnal Pendidikan Dan Kajian Sains*, *10*(1), 128–142. https://doi.org/10.32699/spektra.v10i1.321

Atsani, L. G. M. Z. (2020). Transformasi Media Pembelajaran Pada Masa Pandemi COVID-19. *Al-Hikmah: Jurnal Studi Islam*, *1*(1), 82–93. http://ejournal.kopertais4.or.id/sasambo/index.php/alhikmah/article/view/3905

Cianda, F., Burhendi, A., Dian, W., & Kusdiwelirawan, A. (2019). Implementation of Blended Learning to Use Discovery Learning Method. *International Journal of Innovation, Creativity and Change*, *5*(6), 153–163. http://dx.doi.org/10.30870/gravity.v6i1.7106

Elvianasti, M., Lufri, L., Asrizal, A., & Rikizaputra, R. (2021). Implementasi Pendekatan Saintifik dalam Pembelajaran IPA di Indonesia : Suatu Meta-Analisis. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, *4*(1), 390–398. https://doi.org/10.31004/edukatif.v4i1.1819

Firdaus, A., Nisa, L. C., & Nadhifah, N. (2019). Kemampuan Berpikir Kritis Siswa pada Materi Barisan dan Deret Berdasarkan Gaya Berpikir. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *10*(1), 68–77. https://doi.org/10.15294/kreano.v10i1.17822

Hartono, U., Amarullah, R. Q., & Mulyadi, E. (2023). Hakikat Belajar Menurut UNESCO Serta Relevansinya Pada Saat Ini. *Khidmatussifa: Journal of Islamic Studies*, *2*(1), 22–30. https://doi.org/10.56146/khidmatussifa.v1i2.53

Hasanah, N., Suryana, Y., & Nugraha, A. (2018). Pengaruh Metode Eksperimen terhadap Pemahaman Siswa tentang Gaya dapat Mengubah Gerak suatu Benda. *PEDADIDAKTKA: JURNAL ILMIAH PENDIDIKAN GURU SEKOLAH DASAR*, *5*(1), 127–139. http://ejournal.upi.edu/index.php/pedadidaktika/index

Ichsan Mahardika, A., Wiranda, N., & Pramita, M. (2021). Pembuatan Media Pembelajaran Menarik Menggunakan Canva Untuk Optimalisasi Pembelajaran Daring. *Jurnal Pendidikan Dan Pengabdian Masyarakat*, *4*(3), 275–281. https://doi.org/10.29303/jppm.v4i3.2817

Parwati, G. A. P. U., Rapi, N. K., & Rachmawati. (2020). Penerapan Model Pembelajaran Inkuiri Terbimbing Untuk Meningkatkan Kemampuan Berpikir Kritis dan Sikap Ilmiah Siswa SMA. *Jurnal Pendidikan Fisika Undiksha*, *10*(1), 49–60. https://doi.org/10.23887/jjpf.v10i1.26724

Pratiwi, S. N., Cari, C., & Aminah, N. S. (2019). Pembelajaran IPA Abad 21 dengan Literasi Sains Siswa. *Jurnal Materi Dan Pembelajaran Fisika (JMPF)*, *9*(1), 34–42. https://doi.org/10.20961/jmpf.v9i1.31612

Pristiwanti, D., Badariah, B., Hidayat, S., & Dewi, R. S. (2022). Pengertian Pendidikan. *Jurnal Pendidikan Dan Konseling*, *4*(6), 7911–7915. https://doi.org/10.31004/jpdk.v4i6.9498

Rahayu, N., & Alyani, F. (2020). Kemampuan Berpikir Kritis Matematis Ditinjau dari Adversity Quotient. *Jurnal Pendidikan Matematika*, *4*(2), 121–136. http://dx.doi.org/10.31000/prima.v4i2.2668

Ridho, S., Ruwiyatun, R., Subali, B., & Marwoto, P. (2020). Analisis Kemampuan Berpikir Kritis Siswa Pokok Bahasan Klasifikasi Materi dan Perubahannya. *Jurnal Penelitian Pendidikan IPA*, *6*(1), 10–15. https://doi.org/10.29303/jppipa.v6i1.194

Rini, C. P., Dwi Hartantri, S., & Amaliyah, A. (2021). Analisis Kemampuan Literasi Sains Pada Aspek Kompetensi Mahasiswa PGSD FKIP Universitas Muhammadiyah Tangerang. *JURNAL PENDIDIKAN DASAR NUSANTARA*, *6*(2), 166–179. https://doi.org/10.29407/jpdn.v6i2.15320

Sartika, S. B., Untari, R. S., Rezania, V., & Rocmah, L. I. (2022). *Belajar dan Pembelajaran*. UMSIDA Press.

Sinaga, M., & Silaban, S. (2020). Implementasi Pembelajaran Kontekstual untuk Aktivitas dan Hasil Belajar Kimia Siswa. *Gagasan Pendidikan Indonesia*, *1*(1), 33–40. https://doi.org/10.30870/gpi.v1i1.8051

Suriati, A., Sundaygara, C., & Kurniawati, M. (2021). Analisis Kemampuan Berpikir Kritis Pada Siswa Kelas X SMA Islam Kepanjen. *RAINSTEK (Jurnal Terapan Sains & Teknologi)*, *3*(3), 176–185. https://doi.org/10.21067/jtst.v3i3.6053

Tri Wulandari, & Adam Mudinillah. (2022). Efektivitas Penggunaan Aplikasi CANVA sebagai Media Pembelajaran IPA MI/SD. *Jurnal Riset Madrasah Ibtidaiyah (JURMIA)*, *2*(1), 102–118. https://doi.org/10.32665/jurmia.v2i1.245

Wayudi, M., Suwatno, S., & Santoso, B. (2020). Kajian Analisis Keterampilan Berpikir Kritis Siswa Sekolah Menengah Atas. *Jurnal Pendidikan Manajemen Perkantoran*, *5*(1), 67–82. https://doi.org/10.17509/jpm.v5i1.25853

Yunita, H., Meilanie, S. M., & Fahrurrozi, F. (2019). Meningkatkan Kemampuan Berpikir Kritis melalui Pendekatan Saintifik. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *3*(2), 425–432. https://doi.org/10.31004/obsesi.v3i2.228