An Empirical Approach on Online Radec Learning Model: Does it Affect on Elementary Students' Creative Thinking Skills?

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Abstract

Creative thinking is one of the essential skills that need to be provided to students. However, many teachers do not fully understand how to train creative thinking skills well in the learning process in the classroom, primarily online. This study aims to comprehensively understand how the online Read-Answer-Discuss-Explain-Create (RADEC) learning model affects students' creative thinking skills in elementary schools. Study using a quantitative approach with a one-shot case study design that looked at the opinions before and before treatment. As many as 63 students were selected as samples. Data was collected using a non-test instrument in a questionnaire with a Likert scale. The results showed that the online RADEC learning model could help the creative thinking skills of elementary school students in the medium category. Several obstacles were found, such as the seriousness of students in learning online, an unstable internet network, and the packaging of digital teaching materials prepared by the teacher, so this needs to be considered for further research.

Keywords: online; RADEC; learning model; creative thinking; elementary students

Introduction

The fourth industrial revolution in the 21st-century was marked by advances in information and communication technology (ICT), influencing education so that the term education 4.0 emerged. Education 4.0, according to Frisk, encompasses nine tendencies, including learning anywhere, at any time, and becoming more self-sufficient (Hussin, 2018). As a result, during the Covid-19 pandemic, education 4.0, which includes online learning, gives a choice and teachers as facilitators who may help students become independent. Because of student passion and good teacher ingenuity in carrying out learning during the epidemic, online learning can function smoothly, and also ICT is not something that must be studied again by anyone in education 4.0 but is a supporting system of learning that needs to be mastered (Apak et al., 2021; Hussin, 2018; Rahman et al., 2021; Veronika et al., 2021).

Students must be able to think creatively to compete and thrive in today's environment, which is one of the 21st-century competencies that they should develop (Binkley et al., 2012). Creative thinking is a way of thinking that comes from the imagination and fantasy of divergent thinking. It is used to come up with new and exciting ideas by connecting them to things that aren't related and then putting them into practice later (Chaffee, 2000; Greenstein, 2012; Mazepa-Domagała, 2020; Rawlinson, 2017). Fluency, flexibility, originality, and elaboration are four indicators of creative thinking, according to Torrance (1972). As a result, teachers must foster creative thinking abilities in their students by establishing an enjoyable, demanding, and student-centered learning environment in the classroom.

It is imperative that creativity be taught in schools because it may alter how kids learn and subsequently apply their knowledge to solve problems in the real world in fresh and helpful ways. Additionally, it encourages a variety of thinking skills that students need to develop before they enter the industry and compete on a global scale. Due to this, numerous frameworks suggest that in order for students to compete in the workplace of the future, they should be creative, critical, and backed by strong digital literacy. Additionally, according to the national curriculum, students need to be proficient in knowledge and comprehension, skills and applications, and values and attitudes in order to compete worldwide. A holistic life-course approach, such as creative thinking, is supported by the curriculum, which is focused on ongoing education (Sukardi et al., 2021).

Teaching and learning activities are also the foundation of all educational processes and are carried out in the classroom. Teachers' strategies or learning models for delivering learning material and the learning process that students go through impact whether or not learning goals are attained. The learning model is a name, attributes, sequence, order, and culture for a conceptual and practical learning framework. Joyce & Weil (2004) define a learning model as a systematic pattern or process that guides attaining learning goals. Thus, the learning model can be defined as a conceptual and operational framework that can help achieve learning objectives that follow a logical sequence, including strategies, approaches, methodologies, resources, media, and evaluation instruments to assist the learning process.

Many learning designs and models used by teachers in Indonesia are not necessarily by the character and culture of the Indonesian nation. Mulbar et al. (2021) have conducted research showing increased students' creative thinking skills by using the discovery learning model through a scientific approach. However, it is necessary to pay attention to the indicators of fluency and flexibility. Of course, this requires time to hone students' skills to be fluent and flexible to improve their creative thinking skills. Simanjuntak et al. (2021) found that problem-based learning can help students enhance their creative thinking skills. So that by giving problem-based learning to students, students are trained to constantly develop creative thinking skills, which become their capital to be able to compete in 21st-century life. This research found that the teacher required students to be creative but not correctly facilitated in the classroom. In addition, teachers are also not used to practicing creative thinking skills and are still focused on the final result, not the learning process. Of course, these deficiencies are a concern for improving learning objectives.

For this reason, education experts in Indonesia try to make learning designs such as learning designs based on the nature of science and learning models that are expected to accommodate this, such as the RADEC model. The RADEC model, in particular, was designed based on earlier research that found that there are things that most students, a tiny fraction of students, and no students can master at all through individual study (Sopandi et al., 2014).

Read, Answer, Discuss, Explain, and Create are learning syntaxes used in the RADEC model. Before classroom learning, students obtain information from various learning media, including books, films, animations, and other sources. The activity of receiving this information, especially reading, is the first syntax of the RADEC model, namely Read. The teacher provides pre-learning questions in the Answer syntax, which students must answer based on what they learned in the Read syntax. The questions cover various thinking skills, from low to high. This activity aims to make teaching and learning more efficient. It is premised on students acquiring some of the knowledge they want without the assistance or explanation of the teacher. Students can demonstrate their capacity to learn independently, identify problems using pre-learning questions, and better grasp what they read by using pre-learning questions. Students work in groups to discuss pre-learning questions they completed outside of the classroom or home before coming to the school in the Discuss syntax

part. The teacher encourages students to discuss and communicate actively to get the correct answers. By giving incentives and encouraging students to ask their peers, the instructor can also identify issues faced by students or groups. The group representatives then describe the essential principles learned in the Explain syntax section. With broad discussion groups encompassing all existing groups, the teacher ensures that students from other groups participate in class discussion activities by asking questions, expressing comments, or adding presentations. The teacher can assist students in grasping essential concepts that they haven't yet learned and guarantee that their scientific ideas are valid and suitable. The teacher assures that students from different groups ask questions, express opinions, or add presentation results to the class discussion activities in the last section, called Create syntax. Students apply what they've learned to develop original and creative ideas or thoughts. If students are having trouble stimulating their creative thoughts, teachers can help. Students can create literary works, poems, posters, simple technologies, mosaics, and other types of items (Sopandi, 2017a).

Additionally, another study that utilized the RADEC learning model showed that students creative thinking skills increased significantly by using the RADEC learning model (Ma'ruf et al., 2020; Septianingrum et al., 2020; Wulandari et al., 2020). Based on these things, learning tools arranged using the discovery learning model significantly affect fluency and flexibility and originality and elaboration. Meanwhile, repetitive learning methods impair students' ability to think creatively, so those instructors are required to use various learning strategies, such as problem-based. Additionally, students are given fewer opportunities to explore their ideas. The RADEC learning model impacts students' abilities, but no one has examined how it affects their creative thinking abilities. As a result, the researcher suggests that the RADEC learning model be utilized as an online alternative to employing it during a pandemic.

The results of previous studies related to RADEC, which can increase creativity, include the research of Sukardi et al. (2021), which states that the RADEC model can equip teachers with the ability to design learning that trains creative thinking skills. In addition, Wulandari et al. (2020) and Ma'aruf et al. (2020) also state that the RADEC model can be applied in the learning process to develop students' creativity.

In addition, from several articles on the RADEC model, most of them are still carried out offline, especially for creative thinking skills. No one has implemented it online in elementary schools, only in high schools, and the results need improvements in the learning process in the classroom (Ma'ruf et al., 2020; Sukardi et al., 2021). However, the online RADEC model for critical thinking skills already exists but is limited to primary school teacher mentoring (Lestari et al., 2021). Of course, this is interesting for researchers in implementing the online RADEC learning model to see the impact of implementing this model in elementary school because teachers are generally ready for online learning (Yanuar et al., 2021).

The implementation of the online RADEC model in this study uses a zoom platform for virtual face-to-face activities, while for teaching materials and others using WhatsApp and Google Forms. So that later the research results can see what conditions are from the influence of using the online RADEC model, which can be seen from the situation before and after learning. The instrument used is in the form of a non-test instrument. The data is processed to get N-Gain according to the four indicators of creative thinking skills. So the research questions in this article are:

1.   Does the fluency affect students' creativity through online RADEC learning model?
2.   Does the flexibility affect students' creativity through online RADEC learning model?

3.   Does the originality affect students' creativity through online RADEC learning model?

4.   Does the elaboration affect students' creativity through online RADEC learning model?

5.   What is the value of N-Gain before and after the teacher facilitates online-based learning using the RADEC model?

As a result, the purpose of this research is to get a piece of complete information about the affects and categories of developing students' creative thinking abilities in one of Bandung's Elementary schools utilizing the online RADEC learning model.

Methodology

A quantitative approach with a one-shot case study was used because the treatment was only for one group, and there were no data for the control group (Gall et al., 2003). So it is expected that there will be a good chance in the condition before and after treatment (Haas & Kraft, 1984). Meanwhile, the directly selected samples were students in an elementary school in Bandung, West Java. More details can be seen in Table 1 below.

Table 1. Methodology of Research

Design	one shot case study
Sample	63 students
Technique	Purposive sampling
Instrument	Non-test instrument (questionnaire)
Question	20 items
Indicator of question	4 indicators, @ 5 items/indicator
Scale	Likert
Data collected	Before and after

An expert evaluated the instrument, and the instrument reliability test was conducted using SPSS version 26 and the Pearson Bivariate Correlation method. Cronbach's alpha measures consistency that ranges from zero to one and is used to evaluate the reliability test. The 20 question items have a score of 0.858 in SPSS, suggesting that they are very trustworthy or consistent with the degree of dependability (Hair Jr. et al., 2010).

The data is processed by calculating each item's score and then averaging the results. As a result, it will be used as a percentage in the future to acquire a picture of students' opinions toward creative thinking in learning activities. The obtained Normalized-Gain (N-Gain) value was used to evaluate the requirements for improving students' creative thinking abilities. It is utilized in a single group study with a one-shot case study to examine the efficacy of a particular technique or therapy. According to Meltzer's (2002) opinion, Table 2 shows the N-Gain category.

Table 2. N-Gain Categories and Values

Categories	Values
Low	$g < 0,3$
Medium	$0,7 \leq g \leq 0,3$
High	$g > 0,7$

Results
Based on responses to an online survey about students' perceptions of creative thinking skills, data is obtained and analyzed by calculating each indicator for the average and percentage seen as below.
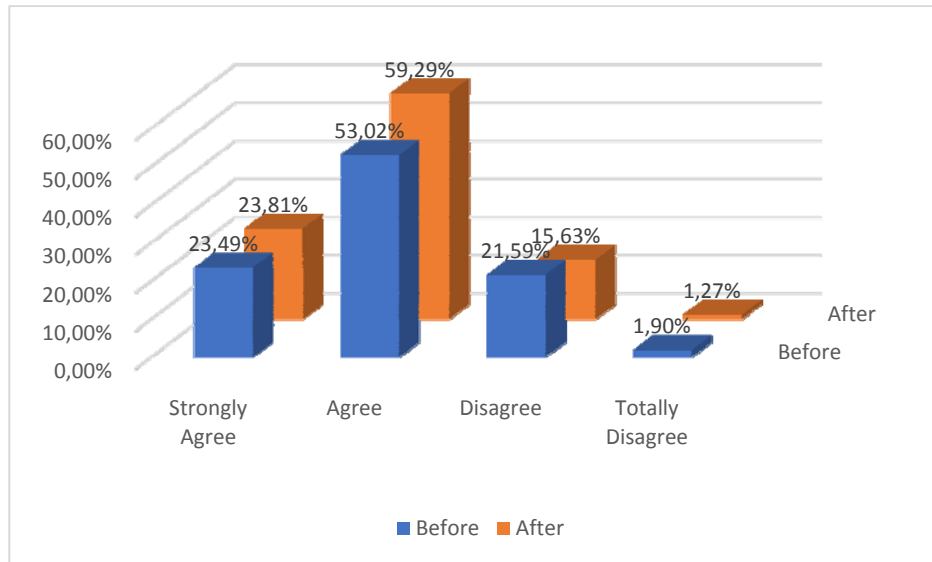

Figure 1. Fluency

Figure 1 shows that most respondents agree or strongly agree that fluency affects students' ability to think creatively. Changes occurred in respondents who agreed by 6,27%.
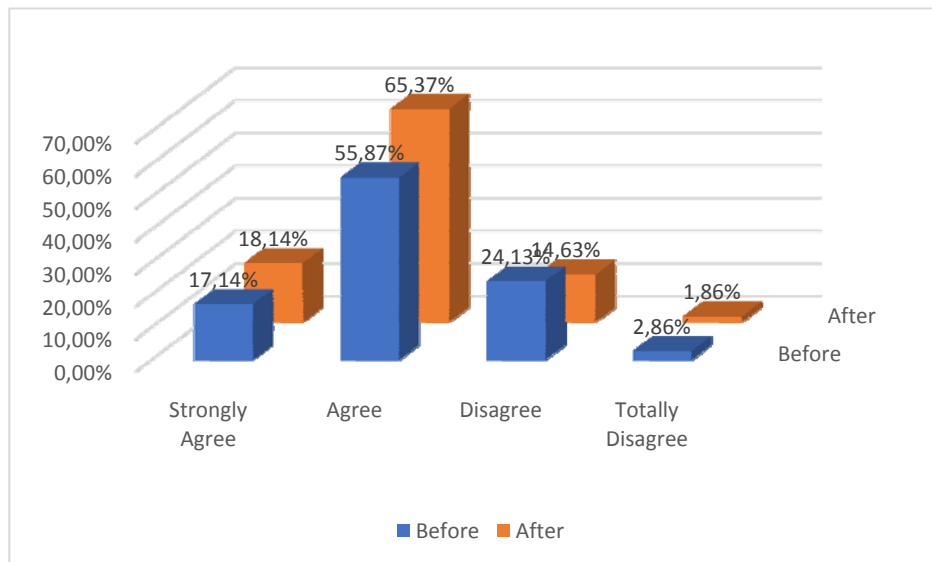

Figure 2. Flexibility

As demonstrated in Figure 2, most respondents agreed or strongly agreed on the flexibility, and respondents who agree increased by 9,49%.
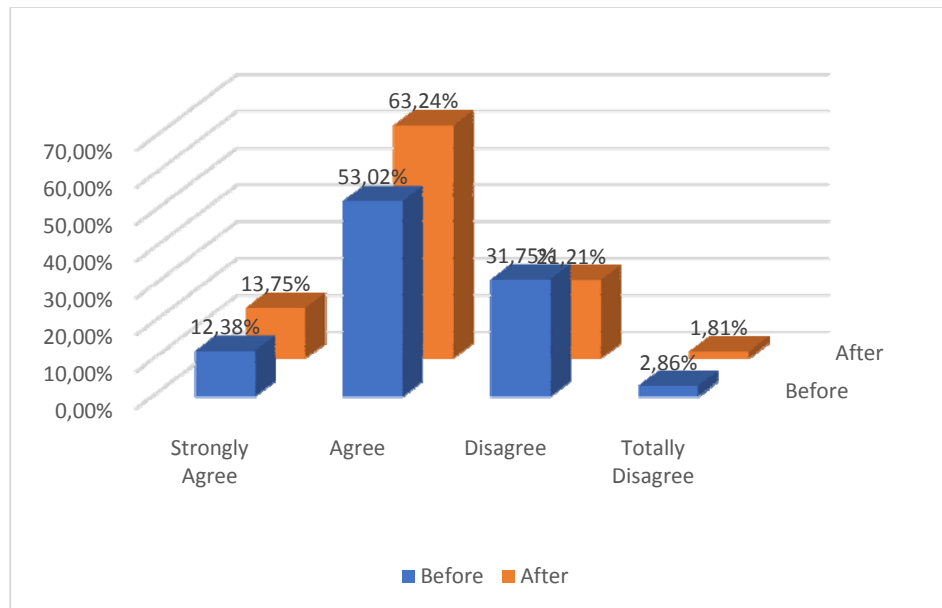
Figure 3. Originality

As demonstrated in Figure 3, most respondents agreed or strongly agreed that originality can influence students' creative thinking skills, and respondents who agree increased by 10,22%.
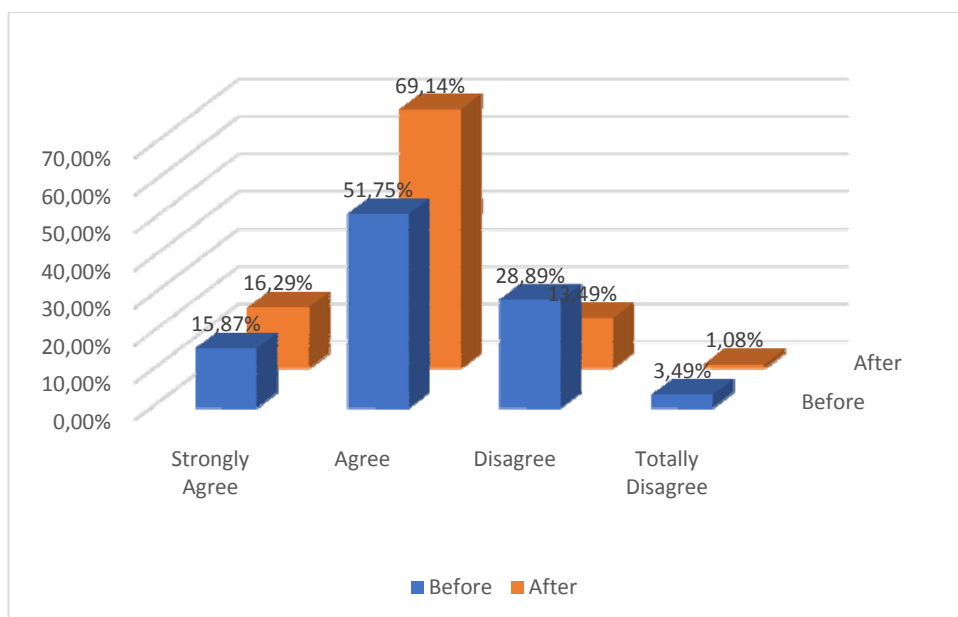

Figure 4. Elaboration

Finally, as illustrated in Figure 4, the majority of respondents agreed or strongly agreed that elaboration is crucial in the development of students' creative thinking skills, and respondents who agree increased by 17,40%.

Discussion

According to Nikkola et al. (2020), fluency has a tangible link with students' creative thinking. The RADEC learning model can help teachers and students become more comfortable with the process of conducting online learnings (Sopandi, 2017a). Although the difference between before and after value is not too significant, it is clear that with the RADEC online learning model, students are accustomed to preparing themselves before learning in class by studying material from reading materials that have been designed by the teacher or other sources and answering pre-learning questions. So that when learning in class, students can smoothly discuss with other students about material that has or has not been understood. The teacher also plays more of a role as a facilitator in learning by providing guided questions to students if things are not understood (Gralewski, J., & Karwowski, 2019). Many creative ideas arise because they already know what they are learning and are well facilitated by the teacher.

The interesting thing that can be traced from this model is that the RADEC model is a model that is easily applied by teachers in Indonesia (Fuadi et al., 2021; Satria & Sopandi, 2019; Setiawan et al., 2019). This is because the syntax of the RADEC learning model has been adapted to the needs of students and the curriculum in Indonesia, especially to develop creativity (Sukardi, et al., 2021). In comparing skills, flexibility is the essential ability to see the differences and similarities between two objects (Handayani et al., 2021). Of course, this can be observed in the students' ability to answer pre-learning questions in the RADEC learning model, based on their reading comprehension. The examples given by students look different from those provided by the teacher. The way students respond to the problems presented by the teacher is also different and can be seen from the creative ideas they convey during group discussions and the results of their group presentations in front of other groups. However, flexibility will not arise if students are not enthusiastic about reading and answering pre-learning questions prepared before class. Teachers should also consider the depth of the material they are going to study.

In other studies, it is essential to stimulate the participants' brains to create new and different ideas (Kashani-Vahid et al., 2017) and pre-learning questions. on the online-based RADEC learning model that is well prepared can stimulate students' creative ideas so that original products emerge from students' thoughts (Sopandi, 2017b). Not only that, the originality of students' ideas can appear when they discuss in groups and explain them to other groups in front of the class. These ideas do not appear suddenly but are obtained from students discussing in groups according to the worksheets prepared by the teacher. There may be strange ideas that arise during the discussion, but it manifests the authenticity of students' thinking. Of course, this needs to be appreciated by the teacher by facilitating student group discussions and providing reinforcement at the end of the activity later, even though the teacher does not answer questions from students who do not understand. It is enough to offer follow-up questions to guide students to understand.

This component may generate meaningful learning, provide knowledge and improve thinking (Rabi & Masran, 2016). Meaningful learning alone will not provide knowledge and improve thinking if students are not accustomed to it. It will also be problematic if the teachers themselves do not understand the learning model. Although it is difficult, with the online-based RADEC learning model, elaboration can be seen in every syntax. Students reading and answering pre-learning questions outside the classroom seem to answer and explain according to the questions given. Students also seemed to add to each other's answers which they felt were still lacking during group discussions. This activity is a good thing that is not seen in other learning models.

If the four indicators show that students' creative thinking skills are combined, most respondents agree and strongly agree. In general, teachers have successfully promoted the development of

students' abilities to think creatively. The value of the change before-after the teacher facilitates online-based learning using the RADEC or N-Gain model is 0,49. If it follows Meltzer's opinion, it is in a medium category. Even though it is a common type, the online-based RADEC learning model can dramatically boost students' creative abilities. The seriousness of students in implementing online-based learning and the lack of understanding of teachers in applying the online-based RADEC model learning have a substantial impact on N-Gain. In addition, it takes time to improve students' creative skills (Cropley & Patston, 2019). It is impossible to learn that students' creative skills will increase considerably because this requires habituation that must be done continuously and is packaged in digital form so that it fulfills 21st-century learning or education 4.0.

There are exciting things that need to be studied later in applying the online-based RADEC learning model in the classroom, such as how to facilitating online learning when students are getting bored of carrying out online learning at home, because it affects student understanding. Teachers also need to practice a lot in making pre-learning questions because the success of the RADEC learning model lies in this. All of them are undoubtedly valuable inputs for further research in increasing the understanding of teachers in implementing.

The RADEC learning instructional was implemented, which encouraged students to think creatively. Before the RADEC learning approach was implemented, they displayed fluency in their reasoning. It can significantly foster kids' inventiveness. The answers to common difficulties were the subject of numerous student suggestions. Students were able to come up with solutions on their own and had fluency in reasoning, even though these solutions might not have been innovative and did not demonstrate many scientific principles. This demonstrates how the RADEC learning paradigm encourages and develops students' fluency in thought (Sujana et al., 2021; Sukardi et al., 2022).

Conclusion

The online RADEC learning model can equip students with creative thinking skills. There was a change in students' opinions before and after the treatment, which agreed that the RADEC learning model affected their creative thinking skills. The result of fluency is 6.27%, flexibility is 9.49%, originality is 10.22%, and elaboration is 17.40%. So the value of the change before-after in the opinion of students who strongly agree and agree after the teacher facilitates online-based learning using the RADEC or N-Gain model is 0.49 or in the medium category. The results could be better if obstacles such as the seriousness of students in learning online and the internet network, which is less stable and digitally packaged learning materials made more attractive, can be considered for further research.

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