



RADEC Learning Model with the Assistance of Media Question Box to Improve Primary School Students' Critical Thinking Ability

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ABSTRAK

Kemampuan berpikir kritis siswa dalam proses pembelajaran IPAS masih rendah dan perlu untuk ditingkatkan. Maka dari itu perlu adanya model pembelajaran yang dapat meningkatkan kemampuan berpikir kritis siswa. Model pembelajaran RADEC yang dipadukan dengan media Question Box menjadi solusi pada masalah ini. Penelitian ini bertujuan menganalisis pengaruh model pembelajaran RADEC berbantuan media Question Box terhadap kemampuan berpikir kritis pelajaran IPAS siswa kelas IV. Penelitian ini menggunakan desain penelitian eksperimen semu dengan rancangan desain penelitian non-equivalent control group desain. Populasi penelitian ini adalah seluruh siswa kelas IV di sebanyak 418 siswa. Teknik penentuan sampel yang dipilih yakni cluster random sampling yang memperoleh 28 siswa sebagai kelas eksperimen dan sebanyak 28 siswa sebagai kelas kontrol. Metode pengumpulan data menggunakan tes berbentuk uraian. Data kemampuan berpikir kritis yang diperoleh dari hasil post-test dianalisis dengan teknik statistika deskriptif dan analisis statistik inferensial dengan Uji-t polled varians. Berdasarkan penelitian yang dilakukan disimpulkan bahwa model pembelajaran RADEC berbantuan media Question Box berpengaruh terhadap kemampuan berpikir kritis pelajaran IPAS siswa kelas IV sekolah dasar.

ABSTRACT

Students' critical thinking abilities in the science and science learning process are still low and need to be improved. Therefore, there is a need for a learning model that can improve students' critical thinking abilities. The RADEC learning model combined with Question Box media is a solution to this problem. This research aims to analyze the effect of the RADEC learning model assisted by Question Box media on the critical thinking abilities of fourth grade students in science and science lessons. This research uses a quasi-experimental research design with a non-equivalent control group research design. The population of this study was all 418 grade IV students. The sampling technique chosen was cluster random sampling which obtained 28 students as the experimental class and 28 students as the control class. The data collection method uses tests in the form of descriptions. Critical thinking ability data obtained from the post-test results were analyzed using descriptive statistical techniques and inferential statistical analysis using the polled variance t-test. Based on the research conducted, it was concluded that the RADEC learning model assisted by Question Box media had an effect on the critical thinking skills in science and science lessons for fourth grade elementary school students.

1. INTRODUCTION

School as an institution is required to provide quality education for students who have skills in the 21st century which includes ability to think creatively (creative thinking), thinking critically and solving problems (critical thinking and problem solving), communicating (communication), and collaborating (collaboration) or so-called with the 4Cs in order to create quality human resources (Pardede, 2020; Yulianti & Tutianingsih, 2020). Independent learning curriculum becomes a very relevant effort in the face of competition in the 21st century (Krishnapatria, 2021; Suryaman, 2020). Curriculum independent study is a learning process between teachers and students who give freedom for deep knowledge and skills in their environment to use to increase the quality of human resources suitable for the 21st century with the Pancasila profile so that students can compete in the world according to current development (Akbar et al., 2020; Nurhayati, 2022).

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Curriculum independent own role important in learning at school , especially at school level elementary school (SD). One of them is merger eye science and social studies lessons become knowledge natural and social knowledge (IPAS) (Fanani et al., 2022; Rahmayati & Prastowo, 2023). Expected merger second eye lesson This will help student become more good in manage environment social and natural they. The purpose of eye this science lesson is for grow interest and curiosity students and encourage they for learn various surrounding phenomena them and their relationships with life daily (Andriana et al., 2017; Yasin et al., 2018). With using IPAS, students study more Lots about concept and how draft the can applied in life daily. Principle base science learning is cultivate a sense of desire high knowledge , ability _ analytical, ability think critical , and ability For make correct conclusion (Indrawanti et al., 2019; Tyas et al., 2020).

Ability think critical is important thing _ in education specifically science learning . Therefore it is good educator or student must know and explore more in about ability think critical so that can applied in the world of education specifically in activity learning (Musliha & Revita, 2021; Winarni et al., 2022). Think critical covers component skills analyze argument, make conclusion use nature of reasoning inductive or deductive, judgment or evaluate, and create decision or solve problem (Chen & Chuang, 2021; Made et al., 2022). Ability think critical have role important for student because with own ability think adequate critical student can solve something problem with systematic, facing challenge in a way organized, as well own rational and logical thinking in accept a information yet of course the truth. So from that's it, educator must capable facilitate his students in develop ability think critical.

In fact , hope student For For develop ability think critically not optimal. Based on interview with guardian class IV at SDN Gugus I North Kuta, mata difficult lesson for understood by students is eye science lessons . This is known from the students' low science subjects scores. Students' daily science and science lesson scores still have not reached the good category based on the established Benchmark Assessment (PAP). This Benchmark Assessment is used in the world of education to determine the level of students' mastery in the field of knowledge. According to the PAP category, students' mastery of knowledge is said to be sufficient if they are able to achieve a percentage of 65-79. However, in reality it is known that only 43.35% of students in Cluster I North Kuta were able to reach the sufficient category and 56.65% were still below the expected category. In learning it is said that teachers have not used a variety of learning models. The lack of students' understanding of the science and science learning concept means that many students still experience difficulties and are less interested in studying science and science subjects.

This is in line with the results of observations made in class V at SDN Gugus I North Kuta. During the learning process, students seemed less focused on learning. There are still some students who joke around during the learning process, thereby disturbing the concentration of other students. Students also lack interest in learning because teachers have not used learning media optimally so that students find it difficult to capture and understand learning material. Teachers only use a few learning methods without additional variations of innovative learning models, causing the knowledge transfer process to only be one way, resulting in a lack of interaction between teachers and students. Students are more often given objective questions so that it does not facilitate students to express their ideas and thoughts in order to develop their critical thinking skills. When the teacher asks questions about the problem posed, only a few students are able to provide arguments while the other students remain silent and repeat the teacher's words without any further thought process to look for other possible answers.

The facts from the results of observations and interviews obtained, it can be said that students' critical thinking abilities in the science and science learning process are still low and need to be improved. Learning is closely related to the thinking process, so it is important for students to develop their thinking skills so they can think more critically (Sari et al., 2020; Toheri & Winarso, 2018). Interesting and fun learning is a factor that can improve students' critical thinking abilities. If there is a gap between expectations and reality, if this is not followed up, it is feared that it will have an impact on students' low critical thinking abilities (Fitrianawati et al., 2020; Malik et al., 2023). Therefore, teachers must create more interesting learning innovations so that students do not get bored in learning and can improve their critical thinking skills. Learning innovation that can be implemented is by implementing a learning model (Nardo et al., 2022; Taofiq et al., 2018).

One learning model that can be applied to improve students' thinking skills, especially critical thinking, is the RADEC learning model (Read, Answer, Discuss, Explain, Create) . The RADEC learning model is claimed to be able to improve students' skills in the 21st century, because students learn independently to understand learning material so they are able to think critically, think creatively and can improve student learning outcomes (Tilova, 2022; Tulljanah & Amini, 2021).

Based on research conducted by previous study regarding the influence of the RADEC learning model on elementary school students' higher-order thinking skills, the results showed that the RADEC learning model had a positive influence on students' higher-order thinking compared to the inquiry learning model (Pratama et al., 2020). The RADEC learning syntax is appropriate to the Indonesian context,

especially at the Read and Answer stages which makes students more ready to learn. Furthermore Discuss, Explain and Create more effective and facilitates the learning process. Research was also conducted that the RADEC model can practice Skills think critical and thinking creative student (Sopandi & Handayani, 2019; Utsman et al., 2022).

Apart from using learning models, choosing the right media can also be done increase liveliness student in learning. One suitable medium combined with a learning model RADEC is with Question Box media (Imran et al., 2011; Satria & Sopandi, 2019). Question Box media is media in the form of box (box) containing possible questions taken by the representative student with using this Question Box media student capable answer question from the teacher with way more pleasant (Sopandi & Handayani, 2019; Utsman et al., 2022). Use of learning models RADEC assistance from the Question Box media is expected can activate students and stimulate ability think critical student so that student capable finish given problem. This matter in line with research carried out by other study who have conclusion that the problem posing learning model assisted by Question Box media is influential to competence knowledge mathematics student class V (Sasmita & Harjono, 2021).

Based on description the problem above, this research aims to analyze the effect of the RADEC learning model assisted by Question Box media on the critical thinking abilities of fourth grade students in science and science lessons for Students Class IV SDN Gugus I North Kuta Year Teachings 2023/2024. The novelty of this study is to providing assistance with question box media for primary school students' critical thinking ability in science.

2. METHOD

This research is quantitative research that uses a quasi experimental design . The form of quasi-experimental design used is non-equivalent control group design. With this design, this research was conducted in two classes (Gopalan et al., 2020). The sample class was used as an experimental class and was treated with the RADEC learning model with the help of Question Box media . The control class was not given any treatment and only learned using the method usually used by the teacher in class. The population in this study was all class IV at SDN Gugus I North Kuta District for the 2023/2024 academic year, consisting of 7 schools with a total of 15 classes and a total of 418 students. After knowing the population, the next step is to determine the research sample. The sampling technique used in this research is Cluster Random Sampling. The method used to determine the sample is by drawing lots. The drawing was carried out twice, namely in the first stage the drawing was carried out by writing all class IV at SDN Gugus 1 North Kuta District on each paper, totaling 15 classes, then the paper was rolled up and the rolled paper was put into a jar. At stage First Two classes were obtained _ sample study ie class IV A SD No. 5 Dalung and class IV B SD No. 1 Dalung . After determine sample , continued with an equality test . Test for equality seen through giving pre-test . Pre-test result value Then analyzed using the t-test with formula polled variance. Methods and data collection used in study this is method test for measure ability think critical student. Test is method obtain data in the form task for done by individuals or group the individual who is tested later from this data can produce score (interval) (Maciejewski, 2020). The test used to measure critical thinking skills is in the form of a description test. The purpose of this test is to determine the thinking process, accuracy and procedures in solving the questions given. In this study, to measure students' science and science critical thinking skills, they used a test in the form of a description (essay).

In this research, the data analyzed is data regarding students' critical thinking abilities using instruments in the form of tests. The type of test used is a test in the form of a description (essay) with a total of 5 questions, each of which will be given a score adjusted to the assessment rubric. The aspect assessed on the critical thinking ability instrument grid for class IV science learning is the material content on changes in the form of substances and their changes. The thinking ability instrument grid can be seen in Table 1.

Table 1. Thinking Ability Instrument Grid

Achievements Learning (CP)	Learning objectives (TP)	Indicator Ability Think Critical	Question Indicator	Number of Questions	Number Question
Students identify forms of energy that exist in the	Students can analyze various energy transformations	Synthesize (compile plan or step with connect between certain units like pictures ,	Served picture , students compile flow of energy changes	1	2

Achievements Learning (CP)	Learning objectives (TP)	Indicator Ability Think Critical	Question Indicator	Number of Questions	Number Question
surrounding environment	in everyday life correctly	schematics , and writing)			
Students analyze changes in energy forms in everyday life	Students can analyze various forms of energy including potential energy and kinetic energy	Analyze (analyze information from pictures, charts, diagrams and maps)	Presented with an image, students analyze information from the image about energy changes	2	1.4
Students understand potential energy and kinetic energy	Students can relate the relationship between kinetic energy and light, heat, sound and electrical energy.	Recognize and solve problem (analyze and solve problem)	Presented with a story, students analyze the elements of the problem and relate them to energy	1	5
		Inferring (reasoning inductively or deductively) Evaluate (judge with certain criteria)	Presented with a story, students conclude the relationship between energy changes and evaluate it	1	3

In this research, the data that has been collected is then analyzed using descriptive statistics (mean, median, mode, standard deviation, variance) and inferential statistics (prerequisite tests and hypothesis tests). Test the prerequisites used is a normality test data distribution and homogeneity test variance. Normality test data distribution is carried out for know where the data comes from from population which is normally distributed or no with use formula Kolmogorov-Smirnov. Homogeneity test variance done For know homogeneity from the results data ability think critical science lessons with use Fisher's test formula . Testing hypothesis done with polled variance t-test.

3. RESULT AND DISCUSSION

Result

The description of the data in this research discusses the data that was obtained during the research activities. The data collected in this research is data regarding the critical thinking skills in science and science lessons of class IV students at SDN Gugus 1 North Kuta for the 2023/2024 academic year. The data that has been collected is analyzed according to previously established data analysis techniques. The experimental group in this study were fourth grade students at SD No. 5 Dalung totaling 28 people. The experimental group was given learning treatment using the RADEC learning model assisted by Question Box media for 6 meetings. At the end of the study, the experimental group was given a post-test . Next, to determine the level of critical thinking skills in science lessons possessed by students, the average (mean) post-test score of critical thinking abilities in science lessons in science students in the experimental group was converted to a benchmark assessment (PAP) on a scale of five. Based on calculations using the average formula (mean), the average percentage of critical thinking abilities in science and science lessons for experimental group students was 81.61%, which is in the high category. The group distribution in the table above can be depicted in the histogram graph in [Figure 1](#).

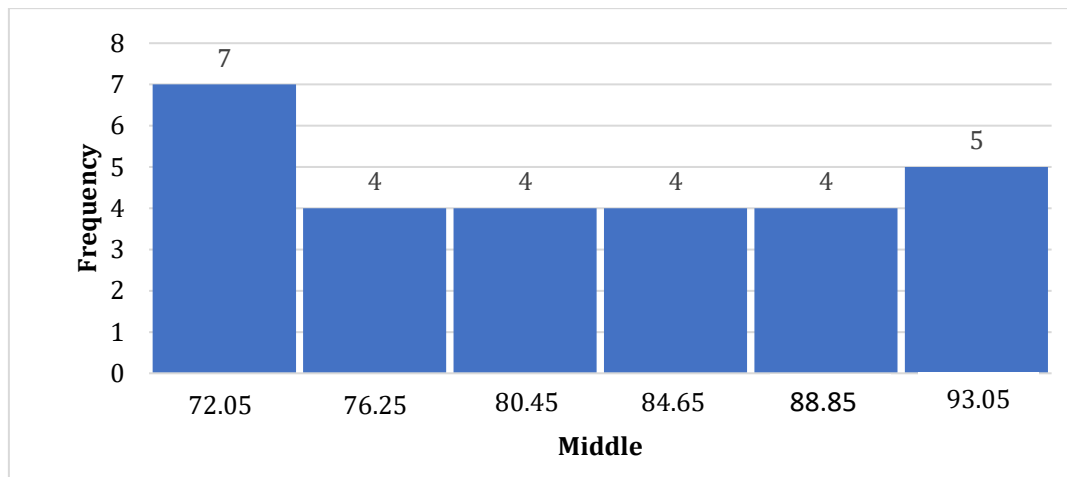


Figure 1. Histogram of Experimental Group Post-test Data

Based on [Figure 1](#), it is known that among the 28 students in the experimental class group, 7 students got a score between 70.0-74.1, 4 students got a score between 74.2-78.3, and 4 students got a score between 74.2-78.3. 4 people scored between 78.4-82.5, 4 students who got a score between 82.6-86.7, 4 students who got a score between 86.8-90.9, and 4 students who got a score between 91-95.1 as many as 5 people. The control group in this study were fourth grade students at SD No. 1 Dalung, totaling 28 people. The control group was given learning treatment with learning activities usually provided by the teacher in class in 6 meetings. At the end of the study the control group was given a post-test . Furthermore, to determine the high or low levels of critical thinking skills in science lessons possessed by students, the average (mean) post-test score of critical thinking abilities in science lessons in science lessons of control group students was converted to a benchmark assessment (PAP) on a five scale. Based on these calculations, the average percentage of critical thinking abilities in science and science lessons for control group students was 73.75%, which is in the medium category. The group distribution in the table above can be depicted in the histogram graph in [Figure 2](#).

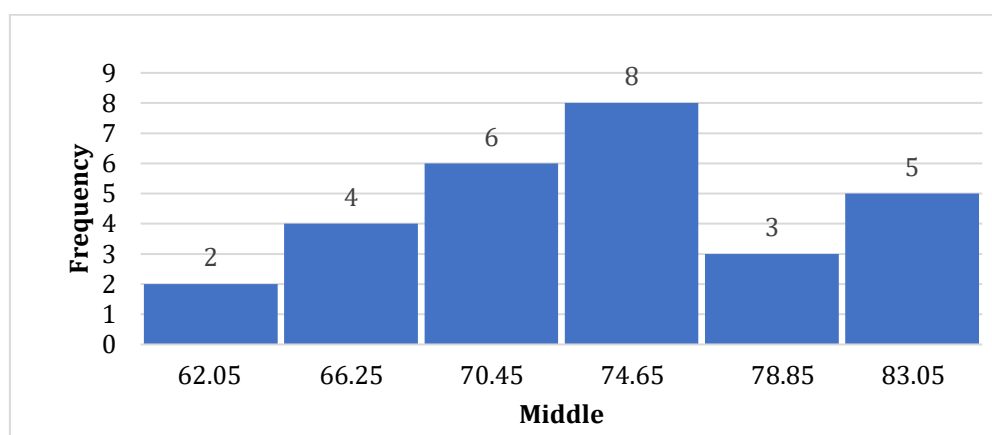


Figure 2 . Histogram of Control Group Post-test Data

Based on [Figure 2](#), it is known that among the 28 students in the control class group, 2 students got a score between 60-64.1, 4 students got a score between 64.2-68.3, and 4 students got a score between 68.4-72.5 as many as 6 people, 8 students who got a score between 72.6-76.7, 3 students who got a score between 76.8-80.9, and students who got a score between 81 -85.1 as many as 5 people. Next, testing of the research hypothesis prerequisites was carried out, namely testing the normality of data distribution and homogeneity of variance. Based on the results of the calculations carried out, it is known that the post-test data on critical thinking abilities in science and science lessons from the experimental group and the control group had a normal distribution. This is because the maximum value ($A1-A2$) < the critical value of the Kolmogorov-Smirnov table at the 5% significance level. A summary of the results of testing the normality of data distribution is presented in [Table 2](#).

Table 2 . Normality Test Results for Experimental Group and Control Group

Group	Many Students	Maximum Value (A1/A2)	Critical Price KS Table	Information
Group Experiment (SD No.5 Dalung)	28	0.246	0.250	Normally Distributed Data
Group Control (SD No.1 Dalung)	28	0.175	0.250	Normally Distributed Data

After testing the normality of the data, a homogeneity of variance test was carried out to show that the two groups of samples taken from one population had the same variance. In this study, a homogeneity test was carried out on the paired variance between the experimental group and the control group. The variance homogeneity test is carried out using the F test with the criterion that if $F_{\text{calculated}} < F_{\text{table}}$ then the data is declared homogeneous. Based on the calculation results, it can be seen that the $F_{\text{calculated}}$ from the post-test results of the experimental and control groups is 1.49, while the F_{table} for the two groups with a significance level of 5% is 4.02. This means that the variance in data on critical thinking abilities in science and science lessons from the experimental group and the control group can be declared homogeneous. The recapitulation of the variance homogeneity test of the post-test results in the experimental and control groups is presented in Table 3.

Table 3. Results of the Homogeneity of Variance Test for the Experimental Group and Control Group

Group	Many Students	F_{count}	F_{table}	Information
Group Experiment (SD No.5 Dalung)	28	1.49	4.02	Homogeneous
Group Control (SD No.1 Dalung)	28			

After carrying out the analysis prerequisite tests, it was stated that the data was normally distributed and homogeneous. Next, parametric statistical analysis was carried out. The statistical analysis to test the hypothesis in this research is using the pooled variance formula t-test . A recapitulation of the t-test results of the post-test on the critical thinking abilities of science students in the experimental and control groups is presented in Table 4.

Table 4. Hypothesis Test Results

Group	Many Students	Average	Variance	Degrees freedom (dk)	t_{count}	t_{table}
Group Experiment (SD No.5 Dalung)	28	81.61	87.14	54	3.45	1.67
Group Control (SD No.1 Dalung)	28	73.75	58.33			

Based on Table 4, it can be seen that $t = 3.45$ with a significance level of 5%, so we get $t_{\text{table}} = 1.67$. This shows that $t_{\text{count}} > t_{\text{table}}$, namely $3.45 > 1.67$, so H_0 is rejected and H_1 is accepted. Based on these results, it can be concluded that there is a significant difference in students' critical thinking abilities in science lessons between the group of students who were taught using the RADEC learning model assisted by Question Box media and the group of students who were not taught using the RADEC learning model assisted by Question Box media in class IV students at Gugus Elementary School. I North Kuta Academic Year 2023/2024.

Discussion

This study held in the first semester of the year 2023/2024 teaching at SDN Gugus I North Kuta. On research This using 2 (two) classes as sample study . As for the second class the ie class experiment that is student class IV A SD No. 5 Dalungs studied with a learning model RADEC (Read, Answer, Discuss, Explain, Create) with the help of Question Box and class media control that is student class IV B SD No. 1 Dalung who doesn't given treatment or activity learning Still apply the usual learning model used by teachers or other models RADEC (Tilova, 2022; Tulljanah & Amini, 2021). On research this, got it results analysis hypothesis that is there is significant difference _ ability think critical science lessons between group students studied _ with a learning model RADEC (Read, Answer, Discuss, Explain, Create) with the help of

Question Box media group students who don't with a learning model RADEC or the learning model used by teachers in class on students Class IV SDN Gugus I North Kuta District Year Teachings 2023/2024.

Differences that emerge in class experiments and classes control caused by the application of the learning model RADEC assisted by the Question Box media used in classroom learning experiment. Application of learning models RADEC assisted by the Question Box media to encourage student For involved in a way active in the learning and learning process in a way independent student connect what he knows with material studied _ with life real (Ayuni et al., 2017; Pertiwi et al., 2019). On activities pre-learning student given material reading namely at the later (read) stage student answer a number of question pre- learning stage (answer) which helps student For adding and sharpening his knowledge about material to be studied. When core learning, students do discussion questions asked at the time activity pre-learning and questions extra taken from Question Box media (Dewi & Widiyana, 2020; Suprianingsih & Wulandari, 2020). After getting a question, students are then required to actively discuss the question.

Discussion activities take place at the (discuss) stage. This discussion activity involves all members in the group so that all students participate in the discussion activity. With the questions given, students are trained to develop their critical thinking skills (Baran et al., 2021; Fadillah et al., 2021). Student then welcome For convey results the discussion namely at stage (explain). At stage This students are also required for active submit question convey opinion they about answers submitted by the group in front class. Next stage (create), student sued For pouring the idea with create a tool or a related simulations with lesson specifically about change energy based on provisions knowledge possessed by students.

Activity learning with using the RADEC model with the help of Question Box media create student more enthusiastic as well as active follow learning and facilitating student For develop ability think critically through read, answer, discuss, explain and create activities (Pratama et al., 2020; Tulljanah & Amini, 2021). This matter in line with research conducted by results study that learning with using a learning model RADEC influential to ability think critical participants ' science lessons educate because of the learning model RADEC has five stages that can be done stimulating ability think critical participant educate (Imran et al., 2011; Ramadini et al., 2021).

Meanwhile in the group control, activities learning still apply the usual learning model used by teachers or other models RADEC. Learning activities using the model used by teachers in control classes tend to be less than optimal. During learning activities, students are less enthusiastic about participating in learning. Learning activities carried out in the control class are only based on the handbooks owned by students and teachers (Made et al., 2022; Utsman et al., 2022). During learning activities, students listen more to explanations from the teacher and work on the practice questions given. This causes students to feel bored during learning activities. In this case, teachers carry out more activities than students when implementing learning in the classroom. When discussing questions, only a few students were active in answering and the other students were passive and only listened to the teacher's explanation. This results in less facilitation of students' critical thinking abilities in learning.

The results of this research are in line with research conducted by RADEC learning model had a more positive influence on students' higher-level thinking abilities compared to the inquiry learning model (Suradika et al., 2023). The difference between this research and the research carried out is that the relevant research applies and compares the RADEC learning model and inquiry learning for high-level thinking skills in elementary schools, while the research carried out discusses the influence of the RADEC learning model assisted by Question Box media on the critical thinking skills of grade students. Other research also stated that the RADEC learning model is relevant for studying cultural diversity, which can be demonstrated by students being able to communicate and equate perceptions so that they can develop critical thinking skills (Satria & Sopandi, 2019).

Based on the results of studies conducted on several studies on the influence of implementing the RADEC learning model, it is known that in general the RADEC learning model can increase activeness and critical thinking skills regarding the material being studied. With the Read, Answer, Discuss, Explain and Create stages, students are required to be active in communicating and equalizing perceptions so that they can develop critical thinking skills. From the results of the studies that have been carried out, it is known that there are still few who have researched the use of the RADEC Learning Model on elementary school students' critical thinking skills in science and science lessons.

4. CONCLUSION

Use learning model RADEC assisted by Question Box media in the learning process give positive influence to ability think critical students' science lessons class IV in Cluster I North Kuta. This matter can seen from average ability value think critical students' science lessons group experiments that are in the category high , meanwhile average ability value think critical students' science lessons group control are in

the category currently. Besides that can Also look at the results testing hypothesis for which t is calculated more big from t table showing that there is significant influence between group learning experiments with a learning model RADEC assisted by Question Box media with group students studied with a learning model conventional.

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