Inside Outside Circle Model Assisted by Audio-Visual Media to Improve Science Cognitive Learning Outcomes of Fourth Grade Elementary School Students

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A B S T R A K

Permasalahan yang terjadi yakni metode pembelajaran IPA di sekolah dasar cenderung masih menggunakan metode ceramah, tanpa adanya partisipasi siswa dalam proses pembelajaran. Penelitian ini bertujuan untuk mengevaluasi pengaruh dari penerapan model IOC berbantuan media audio-visual terhadap hasil belajar kognitif IPA pada siswa kelas IV SD. Penelitian ini menggunakan desain quasi eksperimen dengan desain non-equivalent control group design. Populasi terdiri dari 386 siswa kelas IV di SD. Sampel diambil dengan menggunakan teknik cluster random sampling, dengan 30 siswa sebagai kelompok eksperimen dan 31 siswa sebagai kelompok kontrol. Metode dan instrument pengumpulan data dilakukan menggunakan tes uraian. Data yang terkumpul dianalisis menggunakan teknik statistik deskriptif untuk menggambarkan karakteristik sampel, serta teknik statistik inferensial (uji-t) pooled variances untuk membandingkan hasil belajar antara kelompok eksperimen dan kontrol. Hasil analisis mengindikasikan penolakan terhadap hipotesis nol (H0) dan penerimaan hipotesis alternatif (H1), yang menunjukkan bahwa terdapat perbedaan yang signifikan antara kedua kelompok tersebut dalam hal hasil belajar. Dengan demikian, dapat disimpulkan bahwa penerapan model IOC berbantuan media audio-visual efektif dalam meningkatkan hasil belajar kognitif IPA pada siswa kelas IV SD. Implikasi penelitian ini diharapkan mampu menjadi contoh bagi guru dalam menerapkan model pembelajaran IOC pada pembelajaran IPA.

A B S T R A C T

The problem that occurs is that the science learning method in elementary schools tends to still use the lecture method, without student participation in the learning process. This research aims to evaluate the effect of implementing the IOC model assisted by audio-visual media on science cognitive learning outcomes in fourth grade elementary school students. This research uses a quasi-experimental design with a non-equivalent control group design. The population consisted of 386 fourth grade students in elementary school. Samples were taken using cluster random sampling technique, with 30 students as the experimental group and 31 students as the control group. Data collection methods and instruments were carried out using description tests. The collected data was analyzed using descriptive statistical techniques to describe sample characteristics, as well as pooled variances inferential statistical techniques (t-test) to compare learning outcomes between the experimental and control groups. The results of the analysis indicate rejection of the null hypothesis (H0) and acceptance of the alternative hypothesis (H1), which shows that there are significant differences between the two groups in terms of learning outcomes. Thus, it can be concluded that the application of the IOC model assisted by audio-visual media is effective in improving cognitive science learning outcomes in fourth grade elementary school students. It is hoped that the implications of this research will be an example for teachers in applying the IOC learning model to science learning.

1. INTRODUCTION

Natural Sciences are very essential to understand because they can be directly connected to everyday life, besides that in everyday life, by studying science, educators can teach their students to be able to think critically and objectively, and are able to develop students' potential in forming character through the experience of observing the five senses obtained in the learning process (Astiti et al., 2021;

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Irawati et al., 2021). This goal can be achieved if the science learning process is carried out well. However, in reality, science learning is only carried out in the form of providing theory with the lecture method Fitriyah & Rizki Putri Wardani, 2022; Pinatih & Putra, 2021). In fact, in studying science, students do not understand enough the explanation of the material in the book, but a series of efforts are needed to obtain direct experience for students related to the material they are studying. But in fact, in the process of learning science, there is less practice in the field (Monica et al., 2021; Noge et al., 2020). And the conventional learning model dominates learning, namely the use of lecture methods compared to other learning methods.

The IOC learning model is a technique developed by previous research to foster an attitude of cooperation and sharing information among students (Azmi, 2015; Puspitasari & Murda, 2018). In addition, this IOC model is one of the cooperative learning models that is oriented towards developing communication skills among students. In addition to the use of learning models, the application of media in the learning process has an important role in improving student learning outcomes. In the learning process, media is needed to support learning activities (Ahmaddien et al., 2022; NMS Utami & Renda, 2019). Media is an intermediary tool used to convey messages. By applying a learning media in the learning process, students can be motivated so as to increase students' interest in learning the material presented by the teacher. One of the media that can be used in learning activities is audio-visual media (video). Audio-visual or video learning media helps students to more easily understand the material presented by the teacher, so that it can develop students' interest in learning.

Based on the results of interviews with the homeroom teacher of grade IV of SD Gugus Kolonel I Gusti Ngurah Rai, it is known that there are several obstacles, namely the learning process tends to be monotonous so that students quickly get bored and lack understanding, teachers dominate more during the learning process so that the classroom atmosphere becomes passive and less effective, lack of utilization of learning models and media during the learning process. These obstacles become obstacles for educators in the learning process to improve students' cognitive learning outcomes in creating a quality generation. The problems found certainly greatly affect students' learning outcomes in science knowledge competencies. Based on the PAP guidelines with the conditions in the field, students are still found who have not met the minimum target of mastery. Science knowledge competency in grade IV students of SD in Gugus I Gusti Ngurah Rai is 58.20% so that it has not met the minimum requirement of 90% mastery according to PAP. In overcoming these problems, effective efforts are needed so that participants are active in the learning process in order to improve knowledge competency results, especially in science subjects. The efforts made include utilizing a student-centered learning model to increase student participation in learning activities (Pamungkas & D, 2021; Pinatih & Putra, 2021).

In selecting the learning model that will be used during the learning process, it will influence the learning outcomes of students, therefore in selecting the learning model, it must be adjusted to the needs of the students and precision is required so that it does not conflict with the learning objectives that are to be achieved (Dewi et al., 2019; Prayitno et al., 2023).Of the many existing learning models, the researcher chose the IOC learning model because by implementing this learning model, it is hoped that students will be able to receive the material presented, and students will actively participate during learning, as well as improve learning competency outcomes, especially in science content (Puspitasari & Murda, 2018; Setyawati, 2018). The IOC learning model can help students easily understand the material presented, because students directly share the knowledge gained from their partners, so that all students actively participate in learning and the learning process can take place well and enjoyably. In addition to the learning model, the selection of learning media also affects the success of the learning process (Nuriansyah et al., 2023; Paramita et al., 2021). In order to attract more students' attention, the application of the IOC learning model is assisted by audio-visual learning media (video).

During the learning activities, the use of learning media is needed to accommodate the learning activities in the classroom. Media is a medium used in conveying a message. The use of learning media that will be used by researchers is video learning media (Saputri et al., 2021; Yunitasari et al., 2023). Video is a media in the form of audio-visual, namely media that presents sound with images, videos also function in all fields, one of which is as a learning media in schools. Through video learning media, abstract learning materials can be realized into concrete objects (Al Mamun et al., 2022; Pinatih & Putra, 2021). This will stimulate and improve the cognitive learning outcomes of students. Previous research also stated that there is a significant influence of the IOC cooperative learning model on the learning outcomes of grade IV science (Jahring & Marniati, 2020; Sudarmawan et al., 2020). Based on the results of the analysis, it shows that there is a significant influence on the average activity of learning mathematics in the experimental group, namely 81.77 and the control group, namely 72.68 in elementary school (Futriani et al., 2022; Rusliani, 2020).

Based on the background that has been explained, it is necessary to conduct research that aims to prove the Influence of the IOC Model Assisted by Audio-Visual Media on Science Learning Outcomes in Grade IV Elementary School Students. Therefore, this research aims toevaluate the influence of the

application of the IOC model assisted by audio-visual media on the cognitive learning outcomes of science in grade IV elementary school students.The novelty of this study combines two learning approaches, namely the IOC model based on group interaction and audio-visual media. This combination has not been widely explored in the context of science learning in elementary schools, thus providing a new perspective in improving cognitive learning outcomes. With this study, it is expected to be a reference for teachers in implementing learning models that are different from previous learning methods.

2. METHOD

The type of research used in this study is a quantitative research type where this type of research uses a quasi-experimental research design (Quasi Experiment Design). The form of quasi-experimental design (Quasi Experiment Design) that will be used in this study is the type of Non-equivalent control group design. The Non-equivalent control group design is a design that uses 2 groups with pre-test and post-test measurements, the two groups, namely the experimental group and the control group as research subjects to be compared. The design image used can be seen in **Figure 1**.

$$E: \quad O1 \quad X \quad O2$$
$$\text{---------------------------}$$
$$K: \quad O3 \quad - \quad O4$$
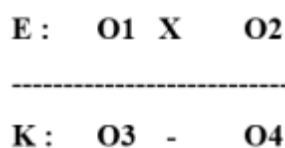
Figure 1. Non-Equivalent Control Group Design Research Design

The implementation of this research consists of three stages, namely, the preparation stage, the implementation stage, and the final stage. There are several activities carried out in the preparation stage, namely the implementation of observations and interviews with the principal and the homeroom teacher of grade IV at the school to find out the number of students, the availability of superior classes, and the problems faced by teachers in science content, the preparation of teaching modules, learning resources, and learning media that will be used in the implementation of the IOC learning model assisted by audio-visual (video), asking for considerations related to teaching modules, learning resources, and learning media with the homeroom teacher of grade IV and the supervising lecturer, compiling pre-test and post-test research instruments in the form of subjective essay-type tests then consulting with the homeroom teacher of grade IV and the supervising lecturer, testing the pre-test research instrument, determining the research sample using the cluster random sampling technique, conducting a lottery in determining the experimental and control class groups, giving a pre-test to two classes that have been drawn to prove the balance between groups, analyzing pre-test data from both groups using the test technique, but previously a prerequisite test was carried out including normality and homogeneity tests.

At the implementation stage, activities were carried out, namely providing special treatment to the experimental class group, namely being taught through the IOC learning model assisted by audio-visual media (video) while for the control class group they were taught with conventional learning, providing treatment 6 times to the experimental group carried out by the teacher, with a predetermined implementation schedule and in accordance with the research material regulated in the curriculum, and providing a post-test to the experimental group and control group. At the final stage, the activities carried out were analyzing research data and conducting hypothesis tests.

The population referred to in this study were all fourth grade students in Gugus Kolonel I Gusti Ngurah Rai which consisted of 6 schools including Elementary Schools 1,2,3,4,5, and 6 Ubung with a total of 386 students. To determine the sample in this study, the Cluster Random Sampling Technique was needed. The sample for this study was 30 fourth grade students of Elementary School 5 Ubung as the experimental group, and 31 fourth grade students of Elementary School 5 Ubung as the control group. The data collection method in this study used the test method. The instrument used was a descriptive test sheet of 10 questions. The instrument grid used can be seen in Table 1.

Table 1. Instrument Test Grid

Achievements Learning	Question Indicator (Learning objectives)
Students can utilize magnetic phenomena in everyday life, and	Students are able to analyze, identify, relate, mention, and give examples of various styles that are often encountered in everyday life correctly using their own language.

Achievements Learning	Question Indicator (Learning objectives)
demonstrate various types of forces and their influence on the direction, movement and shape of objects.	Students are able to relate the relationship between force and motion of objects that are often encountered in everyday life correctly using their own language.
	Students are able to identify the influence of force on the shape of an object.
	Students are able to evaluate the types of styles used during daily activities correctly and using their own language.
	Students are able to create or find their own ideas or categorize examples of style in everyday life correctly and using their own language.

After the instrument is made, testing is carried out. The quality related to the validity of the instrument in several aspects consists of: test validity and test reliability. In this study, the data analysis used was descriptive statistical analysis and inferential statistical analysis. The purpose of using the statistical analysis method in this study is to provide a description of the high or low quality of learning outcomes in the cognitive domain of students who are taught using the IOC learning model assisted by audio-visual media (video). In this method, the quality of cognitive learning outcomes of students can be calculated with the average value (mean), mode, median, and standard deviation. The inferential statistical analysis method is a way of processing data that aims to test the truth of the proposed research hypothesis, based on the results of this test, researchers can draw a conclusion. In this study, the hypothesis test used the t-test, before that, a prerequisite test was carried out in the form of a normality test with the chi-square formula and homogeneity was tested with the F formula.

Hypothesis testing in this study stated that there was a significant influence related to the results of cognitive learning of science assisted by audio-visual media if t_{count} t_{table} with a significance level of 5% with degrees of freedom dk = (n1 + n2) then H_0 is rejected and H_1 is accepted. However, if t count t_{table}, with degrees of freedom dk = (n1 + n2) then H_0 is accepted and H_1 is rejected. Which means that no significant difference was found in the results of cognitive learning of science. $\geq$ $<$

3. RESULT AND DISCUSSION

Result

The data analyzed in this study were data on the cognitive abilities of science learning of grade IV students of SDN Gugus Kolonel I Gusti Ngurah Rai in the 2023/2024 academic year with the topic of Style around you which was learned through the IOC learning model assisted by audio-visual media in the experimental group and the cognitive abilities of science learning of students were learned without applying the IOC model in the control group.The data on the cognitive learning outcomes of the science of the experimental group, obtained through a pre-test of 30 students, showed a variation in scores between 13 and 39, with the score range used being 27. Furthermore, the average pre-test score of the students' science learning outcomes of the experimental group was converted into an assessment scale category to determine the level of quality of the students' science learning outcomes. Based on the results of the analysis, it was obtained that the average score of the students' learning outcomes in the experimental group, with M% = 76, was classified as "Moderate".

In the analysis of the control data of the pre-test of the cognitive learning outcomes of science, the results obtained showed various statistical measures that describe the distribution and center of the data. The average value of the pre-test of the science learning outcomes of students in the control group was converted into a rating scale category to evaluate the level of quality of the cognitive learning outcomes of students. Based on the results of the analysis, it was obtained that the average score of the learning outcomes of the control group students in the pre-test, with M% = 71 was classified as "Moderate".

Assumption submission is the process of conveying or presenting assumptions that form the basis of an analysis or statement. Before conducting a hypothesis test, an important step is to undergo a data analysis prerequisite test. Some conditions that must be met in data analysis include a normality test to evaluate data distribution, and a homogeneity of variance test to check the uniformity of variance among the groups being compared. The normality test for data distribution uses the chi-square formula. Data normality analysis has been carried out on the pre-test and post-test results of science learning data from the experimental group and the control group. Based on the calculation results using the Chi-Square formula, it was found that the pre-test and post-test data from the experimental and control groups showed a normal distribution. The homogeneity test uses the F test. The results of the homogeneity test of the pre-test and post-test variances between the experimental and control groups. Based on the calculation results,

the variance of the data on the results of the cognitive science learning outcomes of the experimental and control groups is homogeneous.

The t-test is used in inferential statistics to assess whether there is a significant difference in students' knowledge competency before and after the application of a treatment on the subject matter. If the t-count value is smaller than the t-table value, the null hypothesis (H0) is accepted and the alternative hypothesis (H1) is rejected. Conversely, if the t-count value is greater than the t-table value, H0 is rejected and H1 is accepted. This test is carried out with a significance level of 5% and degrees of freedom df = n1 + n2 - 2. Based on the calculation results, it can be concluded that the t-count value is 23.34 with a significance level of 5%, while the t-table value obtained is 2.0009. These results indicate that t-count is greater than t-table, resulting in the rejection of the null hypothesis (H0) and the acceptance of the alternative hypothesis (H1). So it can be concluded that there is an influence of the IOC model assisted by audio-visual media on the cognitive learning outcomes of science students of grade IV SD Gugus Kolonel I Gusti Ngurah Rai in the 2023/2024 academic year.

Discussion

The results of this study are expected to provide a clear picture of the effectiveness of the IOC model assisted by audio-visual media in improving students' cognitive learning outcomes. If this model is proven effective, it can be recommended for wider use in the learning process in other schools. Data analysis was carried out using a t-test to see significant differences between the experimental group and the control group, the results of which are summarized in the statistical analysis results table. The IOC (Inside Outside Circle) learning model assisted by audio-visual media provides new experiences for students so that they become more active and master the learning material better. IOC is a cooperative learning model that aims to convey information simultaneously and encourage cooperation between students by forming two groups that pair up to form a circle. The IOC learning model assisted by audio-visual media is a learning model that implements an information exchange system by forming large groups and small groups, before that students are assigned to find information related to the problem through showing learning videos Arya Wiradnyana et al., 2020; Puspitasari & Murda, 2018).This model is oriented to develop speaking skills and improve cooperative relationships among students. This model is expected to develop an active and beneficial learning process for students to improve student interest and learning outcomes Avandra, 2022; Sukmadewi et al., 2019).

The IOC approach is designed to increase student engagement, develop leadership skills, provide experience in group decision-making, and provide opportunities for students to interact and learn from peers from diverse backgrounds (Sukmadewi et al., 2019; Susanti et al., 2020). This learning model becomes more effective when supported by media because it helps teachers in delivering materials during the learning process. Teachers can utilize audio-visual media as a tool to deliver materials, making learning more interesting and easier for students to understand Syachtiyani & Trisnawati, 2021; N. Utami et al., 2022). In the experimental class, the treatment was carried out by implementing the IOC (Inside Outside Circle) learning model assisted by audio-visual media in the learning process. The first step is preparation related to the method to be applied. When entering the class, the researcher began the meeting by greeting and explaining the IOC learning model and the use of audio-visual media that would be used. Students were then divided into two groups that paired up and formed an inner circle and an outer circle. Audio-visual media to convey learning materials, so that students can listen and see the information provided in an interesting and interactive way. Each student in the outer circle conveys the information obtained to students in the inner circle, and vice versa, so that there is an active exchange of information NMS Utami & Renda, 2019; Widiani et al., 2021). In the control class, the learning method used was the lecture method, where the teacher has a central role in the class. The teacher explains the material in front of the class, and students sit in their respective places while listening. Sometimes, the teacher asks light questions to students, but only a few of them show enthusiasm to answer the teacher's questions.

In the learning process, several factors are seen that cause students' learning outcomes in science lessons to still be low. One of them is because teachers have never used the IOC (Inside Outside Circle) learning model and audio-visual media in teaching (Saputri et al., 2021; Wulandari et al., 2021). The IOC learning model is designed to increase interaction and cooperation between students, while audio-visual media can make learning more interesting and interactive. Currently, teachers often use PowerPoint slides to explain materials. Although PowerPoint slides can help present information clearly, this method often makes students passive, just listening without much participation. Using the IOC learning model, students can be more active in interacting and learning from each other (Alfiana, 2022; Dwimarta et al., 2023). Audio-visual media, such as videos and animations, can help explain material in a more interesting and easy-to-understand way. Audio-visual or video learning media helps students to more easily understand the material presented by the teacher, so that it can develop students' interest in learning (Susanti et al., 2020;

Syachtiyani & Trisnawati, 2021). Video is a learning media that provides images and sound, so that through the application of video media it can help students in realizing abstract material (Nanda et al., 2017; N. Utami et al., 2022).

After delivering the material and giving treatment to both classes, namely the control class with the lecture method and the experimental class with the IOC (Inside Outside Circle) learning model assisted by audio-visual media, the next step at the last meeting was to provide a post-test to students to evaluate the learning outcomes of science subjects. The results of the collected data showed that the average learning outcomes in the experimental group using the IOC model assisted by audio-visual media were 41.1, while in the control group using the lecture method, the average learning outcomes were 31.81. The IOC model allows students to participate more actively and interact during learning, while audio-visual media helps in delivering material in a more interesting and easy-to-understand way. Previous research also stated that there is a significant influence of the IOC cooperative learning model on the learning outcomes of grade IV science (Jahring & Marniati, 2020; Sudarmawan et al., 2020). Based on the results of the analysis, it shows that there is a significant influence on the average activity of learning mathematics in the experimental group, namely 81.77 and the control group, namely 72.68 in elementary school (Futriani et al., 2022; Rusliani, 2020).

Based on the results of the study, it can be concluded that there are several factors that influence the differences in student learning outcomes before and after treatment. These factors include determinants such as students' courage and willingness, as well as their abilities in terms of levels of activity, motivation, and initiative to actively participate in the learning process (Ouyang & Scharber, 2017; Suparya et al., 2022). One of the strategies proposed to improve student learning outcomes, especially in science learning for grade IV students of Gugus Kolonel I Gusti Ngurah Rai Elementary School in the 2023/2024 academic year, is the application of the IOC (Inside Outside Circle) learning model assisted by audio-visual media (akhiruddin & Sujarwo, 2020; Arya Wiradnyana et al., 2020). The IOC learning model encourages students to interact and work together more intensively by forming two circles in pairs, where they exchange information and knowledge.

Although this research has been conducted and the objectives of the research have been achieved, there are several limitations in this research. These limitations include, this research was only conducted in one cluster and used 2 schools as samples. Then this research only tested the cognitive aspects of students in science learning. Thus, it is expected that other studies can conduct research with a larger population and test other aspects of knowledge. The implications of this research are that the application of the IOC model assisted by audio-visual media is expected to improve learning outcomes and student learning processes by increasing student activeness in asking questions, their motivation to learn, and their participation in learning. Audio-visual media can help present material in a more interesting and easy-to-understand way, while the IOC model facilitates discussion and collaboration between students, thus creating a more dynamic and effective learning environment.

4. CONCLUSION

Based on the results of the research conducted, it can be concluded that the use of the IOC learning model assisted by audio-visual media is very effective in improving the cognitive learning outcomes of science students in grade IV of SD Gugus Kolonel I Gusti Ngurah Rai in the 2023/2024 academic year. The application of the IOC (Inside Outside Circle) learning model assisted by audio-visual media is very relevant in this context, because it encourages students to be more active in participating and interacting during the learning process.

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