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Quantum Teaching-Learning Model Assisted Audiovisual Media on The Ability of Students' Science Competencies

Ni Luh Regita Sumasningtyas[1*], I B Surya Manuaba[2], Maria Goreti Rini Kristiantari[3]
[123] *Universitas Pendidikan Ganesha, Singaraja, Indonesia*

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ABSTRAK
Kompetensi pengetahuan IPA yang masih rendah akibat proses pembelajaran yang digunakan kurang inovasif, yang mempengaruhi minat belajar siswa dengan berkurangnya minat belajar itu akan mempengaruhi capain pembelajaran. sehinga, dilakukan penelitian dengan tujuan untuk mengkaji pengaruh model pembelajaran Quantum Teaching berbantuan media Audio Visual terhadap kompetensi pengetahuan IPA. Jenis Penelitian ini adalah eksperimen semu dengan menggunakan rancangan Nonequivalent Control Grup Design. Populasi dari penelitian ini ialah seluruh kelas IV SDN sebanyak 191. Teknik penggambilan sampel dalam penelitian ini menggunakan teknik random sampling dengan perolehan sampel kelompok eksperimen sebanyak siswa 34 siswa dan kelas kontrol sebanyak 36 siswa. Instrumen yang digunakan untuk menggumpulkan data adalah tes kompetensi pengetahuan IPA. Data kompetensi pengetahuan IPA dianalisis dengan uji-t. Berdasarkan hasil analisis uji-t diperoleh thitung= 3,71 dan pada taraf signifikansi 5% dengan dk = 34 + 36 – 2 = 68 diperoleh ttabel = 1,67. Hasil analisis menunjukan thitung = 3,71 > ttabel 1,67, maka H0 ditolak. Dengan demikian, terdapat perbedaan yang signifikan kompetensi pengetahuan IPA anatara kelompok siswa yang dibelajarkan dengan model Quantum Teaching berbantuan media audio visual dan kelompok siswa yang dibelajarkan dengan pembelajaran konvensional.

ABSTRACT
The competence of scientific knowledge which is still low due to the learning process used is less innovative, which affects students' interest in learning with reduced interest in learning that will affect learning outcomes. Thus, research was carried out to examine the effect of the Quantum Teaching-learning model assisted by Audio Visual media on science knowledge competencies. This type of research is a quasi-experimental design using the Nonequivalent Control Group Design. The population of this study was all class IV SDN as many as 191. The sampling technique in this study used a random sampling technique with a sample of the experimental group as many as 34 students and the control class as many as 36 students. The instrument used to collect data was a science knowledge competency test. Science knowledge competency data were analyzed by t-test. Based on the results of t-test analysis, it was obtained count = 3.71 and at a significance level of 5% with dk = 34 + 36 - 2 = 68, it was obtained t table = 1.67. The results of the analysis show that t = 3.71> t table 1.67, then H0 is rejected. Thus, there is a significant difference in the competence of science knowledge between groups of students who are taught using the Quantum Teaching model assisted by audio-visual media and groups of students who are taught using conventional learning.

1. Introduction

The world of education that is increasingly advanced cannot be separated from society's very complex role. Without adequate education, it will be difficult for people to achieve their goals and desires for a more advanced civilization. Along with the times, education must also make various innovations to be used according to current developments adjusted to students' character and the learning required by students (Astiti et al., 2017; Susanti & Kusmariyani, 2017; Zainudin, 2018). The solution to every important problem is carried out for the advancement of the quality of education. It must be done immediately and at the theoretical level and directed to practical matters and adapted to the context.

Entering the 21st century, the teacher education system must be more creative in taking advantage of all kinds of opportunities. The 21st century has entered an era of more advanced technology. 21st-century teachers are creative and able to integrate information and communication technology in learning activities (Amran et al., 2019; Husain & Kaharu, 2020; Surya, 2017). 21st-century teachers must

Corresponding author.
E-mail: rerestyas@yahoo.com[1]

be lifelong learners and must be willing to learn from peers and students as well. The characteristics of teachers in effective 21st-century learning are anticipating the future, lifelong learning, cultivating peer relationships, being able to teach and assess all levels of students, being able to distinguish effective technology from non-effective technology (Arwanda et al., 2020; Fitri et al., 2020; Ningsih et al., 2019). The government has tried various ways to achieve the goals of National Education.

However, the field's reality shows that the results have not been optimal. The science test results for fourth-grade students of SDN Gugus Ki Hajar Dewantara are not yet optimal. Most students think that science subjects are boring and difficult to understand. Students tend to memorize science concepts without applying science concepts in everyday life, which causes students to be unable to develop their creativity. At the time of the teaching and learning process, students still depend a lot and wait for the teacher's instructions without trying to solve the teacher's problems first and impacting student activity in the teaching and learning process.

Another problem that exists in the field is the lack of use of technology in the learning process. The use of technology in learning is considered sufficient to attract students' interest in learning. Therefore, it is necessary to use technology in the learning process.

The interest that someone has is not something that can be guessed and comes just like that. A person's interest does not arise suddenly or spontaneously but rather arises from participation, experience, habits during study or work (Amaliya et al., 2011; Sulfemi & Mayasari, 2019; Taukhid, 2016). Therefore, interest will always be related to a need or want. If we are not fishing it is not easy to arouse the interest that exists within us.

Tedious learning can affect students' knowledge of competency mastery. The teacher has an important role in realizing interesting and fun learning for students by varying the learning model according to the lesson plans and students' material. The learning model is a plan or pattern used to guide classroom learning with names, features, syntax, settings, and culture. (Fitri et al., 2020; Istiandaru et al., 2015; Ratnawati et al., 2020). One of the models that teachers can use in the science learning process is the Quantum teaching model. The important thing in learning the Quantum teaching model is how to create certain conditions so that students always need and want to continue learning. With quantum teaching, they can teach by enabling both sides of the left brain, right on their respective functions (Aka, 2016; Tirtoni, 2015; Wahyuning et al., 2017).

The Quantum teaching model is learning that pays attention to the learning environment, a solid foundation, the use of tools, and a dynamic learning design, and the quantum teaching model has the advantage that students are actively stimulated to observe things around them (Aka, 2016; Suryani, 2013; Wahyuning et al., 2017). In addition, teachers must also understand the media's role in the learning process by gaining students' learning experiences. One of the ways to harmonize the quantum teaching model is by using audiovisual media.

Audiovisual media or a set of tools can project moving images and sound simultaneously when communicating messages or information (Handayani et al., 2017; Purbarani et al., 2018; Setianingsih, 2019). Audiovisual media can be interpreted as an intermediary medium or material and its absorption through sight and hearing to build conditions. It can enable students to acquire knowledge, skills, or attitudes (Febryanto, 2015; Firdaus et al., 2018; Sulfemi & Mayasari, 2019). In the 21st century, technology has been very developed with teachers' IT skills who are expected to create a more creative and enjoyable learning atmosphere in the classroom.

This research is supported by relevant research such as (1) research conducted by (Dewi et al., 2019), Those who get research results are the use of quantum teaching with a cooperative learning approach to improve student learning activities and student learning outcomes; (2) research conducted by (Wahyuning et al., 2017), The ones who got the research results were the development of a literacy-based student book and thematic teacher guidebook characterized by quantum teaching which had been tested for its feasibility; (3) research conducted by (Handayani et al., 2017), The results of the study were the application of the picture and picture learning model assisted by audiovisual media had an effect on students' competency in science knowledge.

The purpose of this study was to examine the effect of the quantum teaching-learning model assisted by audiovisual media on the competence of fourth-grade students of SDN Gugus Ki Hajar Dewantara Denpasar for 2019/2020 academic year.

2. Method

This research type is quantitative research with experimental design, namely the Quasi-Experimental Nonequivalent Control Group Design research design. This research was conducted to

examine the quantum teaching model assisted by audiovisual media on students' competency in science knowledge.

This study's population were all fourth-grade students at SDN Gugus Ki Hajar Dewantara South Denpasar for the 2019/2020 academic year, which consisted of six classes in three elementary schools. The total population of this study was 203 students. The sampling technique in this study was random sampling which was randomized by class. Each class had the same opportunity to become the research sample. The sample in this study did not include individual randomization but only class randomization.

The data collection method used in this study is a test. A test is a tool or procedure used to determine or measure something in an atmosphere, in a predetermined manner and rules. In this study, a research instrument in an ordinary multiple-choice objective test with four choices A, B, C, D containing one correct answer. The number of items in the test grid for this instrument is 50 items. This research also uses a validity test, reliability test, difference power test, and difficulty index.

The technique used to analyze research data in this research is descriptive statistical analysis techniques and inferential statistics. Descriptive statistics are a way of processing data by describing the collected data without making general conclusions, namely calculating the average, standard deviation (standard deviation), and calculating the variance. Inferential statistical analysis (often called inductive statistics or probability statistics) is a statistical technique used to analyze sample data and the results applied to the population. Inferential statistical analysis is divided into analysis prerequisite tests (data distribution normality test and variance homogeneity test) and hypothesis testing.

3. Result and Discussion

The data generated in this study were students' competency data on science knowledge obtained through giving tests. The recapitulation of students' science knowledge competencies is presented in Table 1.

Table 1. Students' Science Competencies

Data	Class	
	Experiment	**Control**
Mean	82,79	74,78
Standar deviasi	8,09	9,48
Varians	65,38	89,83

Table 1 shows the difference between the experimental class and the control class. Students' science knowledge taught using the Quantum teaching-learning model assisted by audiovisual media resulted in a mean of 82.79 standard deviations was 8.09 and variance was 65.38. Meanwhile, the competence of students taught by conventional learning models resulted in a mean 74.78 standard deviation of 9.48 and a variance of 89.93.

The data analysis technique used to test the research hypothesis is the t-test. Before testing the hypothesis, a prerequisite test is carried out, the normality test and the homogeneity test. It aims to determine the competency data of students' science knowledge taught using the Quantum teaching-learning model assisted by audiovisual media with conventional learning models that are completely normally distributed and homogeneous.

Kolmogorov Smirnov carried out the data distribution normality test with the help of Microsoft Excel for Windows. The summary of the results of the homogeneity test analysis is presented in Table 2.

Table 2. Data Distribution Normality Test Results

Class	Ft-FS Max	Criteria	Kolmogorov-Smirnov	Information
Ekxperiment	0,14	<	0,24	Normal
Control	0,10	<	0,22	Normal

Table 2 presents the results of the D-count for the experimental class and the control class. In the experimental class, the highest D-count = 0.14. Whereas at $\alpha = 0.05$ (n = 34) obtained D-table = 0.24. It means that the D-count is smaller than the D-table. Thus the post-test data for the experimental class is normally distributed. Furthermore, in the control class, the results obtained by the greatest D-count =

0.10. Whereas at α = 0.05 (n = 36) obtained D-table = 0.22. It means that the D-count is smaller than the D-table. Thus the post-test data for the control class is normally distributed.

The homogeneity test is carried out to show that the differences in the hypothesis test occur due to differences between groups, not as a result of differences in groups. Before doing the homogeneity test, first look for the variance of the post-test of each class. Based on the calculations results with the help of Microsoft Excel for Windows, the variance values were obtained, namely the experimental class variance (65.38) and the control class variance (89.48).

After the two classes' variance data is obtained, the next step is to calculate the F value, based on the calculation obtained by Fcount = 1.37. Then compared with F table in the denominator df = 35 and df denominator 33. F table = F (0.05; 35; 33) = 1.77. Because Fcount <Ftable, the post-test data has the same or homogeneous variance. The results of the variance homogeneity test can be seen in Table 3.

Table 3. Variance Homogeneity Test Results

Sampel	S^2_1	S^2_2	DK	Fhitung	Ftabel	Simpulan
Kelas IV SDN 14 Pedungan dan Kelas IV SDN 1 Pedungan	65,38	89,83	68	1,37	1,77	Homogen

The normality and homogeneity tests showed that the students' science knowledge competency data had met the prerequisite tests so that data analysis could be continued. The next data analysis is testing the research hypothesis. Hypothesis testing is done by using the t-test. The testing criterion is that H0 is accepted if tcount ≤ ttable. Conversely, if tcount> ttable then H0 is rejected, the recapitulation of the t-test results for the study sample group can be seen in Table 4.

Tabel 4. Rekapitulasi Hasil Uji t Kelompok Sampel Penelitian

Kelompok Sampel	N	Dk	t_{hitung}	t_{tabel}
Eksperimen	36	68	3,71	1,67
Kontrol	34			

Based on the results of the t-test analysis, it was found that t-count = 3.71 while the t-table value at a significant level of 5% with degrees of freedom (n¬1 + n2 - 2) = 34 + 36 - 2 = 68 was 1.67. Thus tcount = 3.71> ttable = 1.67 then H0 is rejected or there is a significant difference in the competence of science knowledge between the group that was taught through the quantum teaching-learning model assisted by audiovisual media and the group that was taught using conventional learning in the fourth grade of SD Negeri Gugus. Ki Hajar Dewantara South Denpasar, 2019/2020 academic year.

Based on the results of hypothesis testing using the t-test, it is obtained tcount> ttable in which H0 is rejected. The results showed significant differences in students' science knowledge between students who were taught using the Quantum Teaching-learning model assisted by audiovisual media and conventional learning models.

The Quantum teaching-learning model is a directed learning plan that makes learning nuances enjoyable by combining several aspects, resulting in dynamic learning interactions to create high learning achievement. Using the quantum teaching model assisted by audiovisual media can help the learning process, making the learning atmosphere more interesting and boring for students.

In the learning process with the quantum teaching model assisted by audiovisual media, students are first motivated to develop their interest in learning through observing learning objects assisted by audiovisual media. It causes student participation and enthusiasm to be greater in learning. In addition, students will be stimulated to express ideas or opinions about the material being discussed. (Aka, 2016; Tirtoni, 2015; Wahyuning et al., 2017) stated that quantum teaching could increase student learning motivation, student learning outcomes, and student interaction in the learning process.

In addition, another stage in learning with the Quantum teaching model assisted by audiovisual media is the demonstration. Students are guided to interpret the ideas in the discussion after applying the media. Learning through demonstrations carried out in Quantum teaching will be more meaningful, easier and more interesting to learn. In the learning process with the Quantum teaching model it also provides an opportunity for students to understand the material discussed through the "repeat" stage, in this stage the teacher guides students to emphasize and conclude the material being studied so that students' understanding can be maximized. It is in line with the findings (Aka, 2016; Dewi et al., 2019; Wahyuning et al., 2017), which states that the Quantum teaching-learning model can maximize students' memory because of the "repeat" stage.

This research is supported by relevant research such as: (1) research conducted by (Dewi et al., 2019), Those who get research results are the use of quantum teaching with a cooperative learning approach to improve student learning activities and student learning outcomes; (2) research conducted by (Wahyuning et al., 2017), The ones who got the research results were the development of a literacy-based student book and thematic teacher guidebook characterized by quantum teaching which had been tested for its feasibility; (3) research conducted by (Handayani et al., 2017), The results of the study were the application of the picture and picture learning model assisted by audiovisual media had an effect on students' competency in science knowledge.

Learning using the quantum teaching-learning model assisted by audiovisual media provides higher competency results in science knowledge than learning with conventional learning models (Pradilasari et al., 2019; Pranowo & Prihastanti, 2020; Septiani & Hasanah, 2019). The quantum teaching-learning model allows students to develop students' potential optimally in easy, fun, and involve one another. Audiovisual media assistance can make it easier for teachers to stimulate thoughts and focus students' attention. Teachers can apply science learning using quantum teaching models assisted by audiovisual media to increase students' competence in science knowledge and create meaningful and fun learning.

4. Conclusion

Based on the research and discussion results, it can be concluded that there is a significant difference in the competence of science knowledge of students who are taught using the quantum teaching-learning model assisted by audiovisual media and those taught with conventional learning models.

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