Qalamuna - Jurnal Pendidikan, Sosial, dan Agama | Vol. 14 No. 1 (2022)
787-806

THE EFFECTIVENESS OF HOLOGRAPHIC LEARNING MEDIA ON THE LEARNING OUTCOMES OF CLASS V IPAS MATERIAL OF THE EARTH'S LAYERS

Yusuf Nur Abidin [1], Sigit Yulianto [1]
[1] Universitas Negeri Semarang, Indonesia
**Corresponding Address*: *yusufgondang@students.unnes.ac.id*

Received: 01 March 2022 | Approved: 22 May 2022 | Published: 29 June 2022

Abstract: The use of inappropriate learning media often causes the problem of unsatisfactory learning outcomes in students. Therefore, researchers are interested in examining the utilization of hologram learning media to increase students' interest in learning and directly lift the quality of their learning outcomes. This study aims to evaluate the effectiveness of using hologram learning media in improving the achievement of learning outcomes in Natural and Social Sciences (NSP) subjects for fifth-grade students at Wonosari 01 Elementary School in Semarang City. Using a quasi-experimental Pretest-Posttest Control Group design, 51 students were sampled and divided into experimental class VA (25 students) and control class VB (26 students). The results showed a significant effect of hologram learning media on student learning outcomes. Hypothesis analysis using a t-test showed that the t(calculated) value of 41.37 exceeded the t(table) value of 2.009 at the significance level of α= 0.05. This shows that the use of hologram learning media statistically significantly affects the learning outcomes of fifth-grade students at Wonosari 01 Elementary School in Semarang City.

Keywords: Learning Outcomes, Learning Media, Hologram, IPAS

INTRODUCTION

In the context of learning, communication is established between teachers and students. The teacher is in charge of conveying information, while the student acts as the recipient of information. The success of this process largely depends on how the interaction between the two parties runs smoothly, where the teacher must be able to convey information effectively to students. In contrast, students need to have the skills to receive the information. To improve communication between the sender and receiver of the message and create effective communication, using communication tools or media is necessary (Septiana et al., 2020).

Communication tools or media are required to improve communication between the conveyer and receiver of information and create effective communication. Learning media has a crucial role in the world of education. Essentially, learning media has become an integral part that can provide a significant learning experience. Overall, the function of learning media is as a means of communication that supports the learning process, as highlighted by (Jayaputra et al., 2017). Learning media is an effective intermediary in delivering material to learners so they can understand it better. Using learning media in the context of teaching can not only trigger new learning interests, increase motivation, and improve learning outcomes but also have a significant psychological impact on learners, as revealed by (Arsyad & Fatmawati, 2018).

Learning media has the potential and power to direct students' thoughts and actions toward more constructive and dynamic changes. (Muasyaroh et al., 2022). This media is considered an important tool of the education system. Using educational media accelerates the learning process. It allows students to retain more information and engage more deeply in the subject. Students may not fully understand the material if they only rely on oral explanations from the teacher. However, learning will be more effective if learning is done through activities that allow students to see, hear, smell, feel, or experience the concept themselves through educational media. Educational media has a very important role in improving student learning outcomes.

By integrating media into their teaching, teachers are no longer the only source of knowledge for their students. Teachers can collaborate with the media to deliver subject matter and teaching strategies. This frees up teachers' time and energy to focus on other aspects of education, such as guiding students who are having difficulties, shaping students' characters, inspiring them to learn, and so on (Rochmania & Restian, 2022).

The provision of learning materials by teachers is the basis for students to achieve learning achievements. This means that the components students obtain become the result or output of their learning process (Festiawan, 2020). Learning outcomes include the abilities obtained by students after

they experience teaching from teachers or educators. The experience gained by students includes affective, cognitive, and psychomotor aspects (Hutapea, 2019). Learning outcomes are crucial in the learning process because, through these results, teachers can monitor the development of experience or knowledge that students have gained, which will help in planning the next teaching and learning process (Wibowo et al., 2021). In the context of learning, the existence of media is very helpful for students in understanding abstract material, namely material that cannot be observed directly by the eye.

In the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, it is explained that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious and spiritual strength, self-recognition, personality, intelligence, noble character, and skills needed by themselves, society, nation, and state.

IPAS (Natural and Social Sciences) education has an important role in educating the nation's life by the objectives of national education. IPAS learning provides opportunities for students to learn about themselves and the surrounding environment using the scientific method. IPAS learning aims to develop students' potential through their experiences in exploring and understanding the natural world scientifically.

Based on observations and interviews conducted with teachers and fifth-grade students of Wonosari 01 Elementary School in Semarang City on January 15, 2024, IPAS learning activities on "earth layers," there are several problems in the learning process. One of the problems is that the teacher has not used interactive media that can meet each learner's needs. Learning media is used on certain materials only and is still very limited.

These problems eventually have an impact on students' learning activities. Their motivation to learn is decreasing, making it difficult to focus on learning. Students quickly feel bored and sleepy and often joke with their friends. The low quality of learning like this results in students having difficulty constructing concepts, laws, or principles in IPAS learning material on the earth's layers. This was conveyed directly by the VA class teacher and was supported by the results of daily test learning, where 84% or 20 out of 25 students whose scores were still incomplete or had not reached the KKM (minimum completion criteria).

Based on previous explanations and observations, researchers are interested in investigating the use of holographic learning media in earth layer material. The use of holographic media has been shown to improve student understanding. The results show that using interactive learning media

greatly benefits students by facilitating understanding of the material in an effective and fun way (Aslam et al., 2021).

Learning media is divided into three elements: sound, visual, and motion (Lukman et al., 2020). Two of the three media types, namely visuals and motion, can be projected as holograms. Holograms are the result of holography technology. One of the advantages of holograms is their ability to store information by presenting real three-dimensional (3D) objects. This 3D display is something that is interesting for students and can increase their interest in learning. In addition, holograms can also be used by more than one person simultaneously. Another advantage is the lower level of radiation compared to image media or learning videos because learners do not need to look directly at the cellphone screen but through the reflection of the hologram (Ferdiansyah et al., 2022).

The results of research conducted by (Antasari et al., 2021) showed that the activity and After using the Holographic Pyramid media, student learning outcomes, which initially reached 33.00, increased to 94.00, achieving excellent qualifications. The Wilcoxon test results show a significance value of 0.004, smaller than the significance limit of 0.005. Therefore, the null hypothesis (H0) is rejected, and the alternative hypothesis (Ha) is accepted. This shows that using Holographic Pyramid media in thematic learning of grade VI at MI Sullamut Taufiq significantly influences student activity and learning outcomes.

The results of research conducted by (Hasyim, 2019) The use of hologram media in the learning process positively impacts students. This makes learning more interesting, encourages learning motivation, makes the material clearer and easier to understand, and allows students to achieve learning objectives better. Teaching methods become more varied and not monotonous, so students do not feel bored. They are more actively involved in learning activities like observing, doing, and demonstrating. Learning outcomes obtained through meaningful learning tend to be more durable, form a positive personality, and are useful in learning other aspects and developing creativity. Hologram media can also improve student learning outcomes, as seen from the increase in active student participation from 45% to 80% during the learning cycle.

The results of research conducted by (Antasari et al., 2021) and (Hasyim, 2019) have the same results, namely having good effectiveness in using hologram media. Both studies used hologram media with a pyramid shape. In this study, researchers tried to use hologram media with a different shape, namely a hologram box. In addition, the content of learning materials is different from previous studies so it can expand the scope of the use of hologram media in learning.

As explained above, research on hologram media is effectively used as a learning medium because it can improve student learning outcomes; this media also makes it easier for teachers to

convey material by showing visual images in real time. With the non-application of this hologram media at Wonosari 01 State Elementary School in Semarang City, researchers are interested in conducting research on the effectiveness of hologram learning media on the learning outcomes of IPAS fifth-grade students on the earth's layers, as for the place of research conducted at Wonosari 01 State Elementary School in Semarang City. This study aims to determine whether hologram learning media affects the learning outcomes of IPAS grade V at Wonosari 01 State Elementary School in Semarang City on the material of the earth's layers.

METHODS

This type of quantitative research uses experimental methods in the form of *quasi-experimental design*, which is carried out using a *non-equivalent control group design.* This structure involves two groups: the control and experimental groups. The experimental class receives treatment using hologram learning media, while the control group does not receive special treatment.

The researcher used a *Pretest-Posttest* Control Group Design to conduct the study. This pattern can help know what to do:

Table 1. Pattern of *Pretest-Posttest* Control Group Design

E	**O1**	**X1**	**O2**
K	**O3**		**O4**

E	**:**	**Experiment Class**
K	**:**	Control Class
X	**:**	Behavior
O1	**:**	Experiment Class Pretest
O3	**:**	Experiment Class Posttest
O2	**:**	Control Class Pretest
O4	**:**	Control Class Posttest

After an initial pretest was conducted to establish the starting point of each group, the experimental group received learning using holographic learning media. In contrast, the control group received no special treatment. Both groups are then given a posttest as a final evaluation after the treatment, and the results of the pretest and posttest are compared to evaluate the impact. Population refers to a collection of data representing the whole of a statistical area, consisting of elements or individuals with certain characteristics and conditions, which then become the focus of study and analysis (Sugiyono, 2019). The subjects in this study were all fifth-grade students of Wonosari 01 State Elementary School in Semarang City, totaling two classes with 51 students. The sample is part

of the population from which the data source is taken (Sugiyono, 2019). In this study, with a total of 51 subjects, the sample was taken from the entire population consisting of two classes: a control class called V-A and an experimental class called V-B. This sampling approach is known as the total sampling method, where the entire population is sampled.

As part of the data collection process, a test instrument was used to evaluate whether there was an improvement in the learning outcomes of IPAS subjects when using hologram-based learning media. The multiple choice test has 20 questions (options a, b, c, and d). Before the test instrument can be used in research, it goes through several stages, including validity, reliability, question difficulty, and differentiation tests. After going through this process, the test instrument was deemed fit for the study. Liliefors, Fisher, and t-tests were used to ensure that data collection was done correctly. All these procedures were conducted at the 5% significance level, with α= 0,05

RESULTS AND DISCUSSIONS

Finding

Before the questions were given to the control and experimental classes, the pretest and post-test questions were tested for validity. According to (Sugiyono, 2019), valid means that the instrument can and is precisely used to measure what should be measured to obtain the right results. In this study, researchers tested instruments in multiple-choice questions to determine validity, reliability, difficulty level, and differentiation. The test instrument, in the form of multiple choice questions, was analyzed with the help of Excel applications, and the significance level was 5%.

Table 2. Question Validity Test

Test No	Number of Corrections	R Count	Results
1	10	0,458	Valid Question
2	15	0,661	Valid Question
3	13	0,532	Valid Question
4	15	0,516	Valid Question
5	6	0,565	Valid Question
6	15	0,492	Valid Question
7	13	0,680	Valid Question
8	12	0,723	Valid Question
9	11	0,654	Valid Question
10	12	0,683	Valid Question
11	13	0,511	Valid Question
12	9	0,445	Valid Question

Test No	Number of Corrections	R Count	Results
13	14	0,598	Valid Question
14	12	0,642	Valid Question
15	15	0,492	Valid Question
16	15	0,661	Valid Question
17	12	0,723	Valid Question
18	13	0,511	Valid Question
19	14	0,661	Valid Question
20	15	0,598	Valid Question

The results of the question validity test using a significance level of 5% with twenty questions and nineteen respondents are valid. The criterion used is that the R-hitting value must be greater than the R-table value of 0.432 to indicate that the data is valid. In the table above, all items have a value greater than the R-table, indicating that all questions are valid.

After the question is declared valid, the next step is to test the reliability of the questions given to respondents. Reliability refers to the concept that an instrument can be relied upon as a data collection tool because it has proven reliable (Della et al., 2022). Reliable instruments will produce reliable data as well. If the data obtained is by the truth and reality, it will remain consistent every time it is taken. In other words, reliability means trustworthiness. Reliability is closely related to the accuracy and consistency of the instrument so that it will produce similar results in repeated measurements or tests and is reliable (Tahun et al., 2023). The reliability test continues the validation test, where only valid questionitems are tested. In this case, the reliability test is carried out using the following formula:r_k =

Reliability Criteria	
0,000 – 0,200	Very Low
0,202 – 0,400	Low
0,401 – 0,600	Medium
0,601 – 0,800	High
0,801 – 1,000	Very High

(Loka Son, 2019)

Table 3. Problem Reliability Test Results

Average Total Score	**13,36842**
n	20
Total Score Variance	30,35673
KR21 Reliability	0,898926
Reliability Level	very high

The data shows that the reliability of the question has a score of 0.898. When compared to the question criteria table, it can be stated that the instrument has a very high reliability and can be done by testing the difficulty of the question. A question can be considered good if it is neither easy nor difficult. A good question is neither simple nor complicated (Tahun et al., 2023).

Question difficulty test

Related to students' cognitive development in the learning process, too easy questions cannot encourage students to think critically. At the same time, too difficult questions will make students struggle. In determining the difficulty level of a question, it is important to understand that the smaller the difficulty index value obtained, the higher the difficulty level of the question, and vice versa.

Tabel 4. Problem Difficulty Test Results

Test No	Number of Corrections	Number of Students	Difficulty Index	Questions Category
1	10	19	0,562	Medium
2	15	19	0,789	Easy
3	13	19	0,684	Easy
4	15	19	0,789	Difficult
5	6	19	0,316	Easy
6	15	19	0,789	Easy
7	13	19	0,684	Easy
8	12	19	0,632	Medium
9	11	19	0,579	Easy
10	12	19	0,632	Easy
11	13	19	0,684	Medium
12	9	19	0,474	Easy
13	14	19	0,737	Easy
14	12	19	0,632	Easy
15	15	19	0,789	Easy
16	15	19	0,789	Easy
17	12	19	0,632	Easy
18	13	19	0,684	Easy
19	14	19	0,789	Easy
20	15	19	0,737	Easy

Table 5. Classification of Problem Difficulty Indices

Interval	Criteria
0,0 <IK< 0,20	Very Difficult
0,21 <IK< 0,40	Difficult
0,41 <IK< 0,60	Medium
0,60 <IK< 0,90	Easy
0,91 <IK< 1,00	Very Easy

(Loka Son, 2019)

From the test of the difficulty of the question, it was found that the question had a difficulty level from easy to medium and difficult when compared to the question difficulty index calcification table. Next, the question will be tested to distinguish power.

The discriminating power of a question refers to the question's ability to separate students with high abilities and students with low abilities. The value that shows how much the differentiating power is referred to as the discrimination index, which is abbreviated as D. The formula used to analyze the discriminating power of a question is as follows:

$$D = \frac{B_A}{J_A} - \frac{B_B}{J_B}$$

Information:

J = number of test takers

J_A = many participants in the upper group

J_B = many participants in the lower group

B_A = the number of upper group participants who answered the question correctly

B_B = the number of lower group participants who answered the question correctly

Table 6. Question Differential Test Results

Test No	Number of Corrections	BA	BB	JA	JB	D
1	10	7	3	10	9	0,367
2	15	9	6	10	9	0,444
3	13	8	5	10	9	0,244
4	15	9	6	10	9	0,233
5	6	5	1	10	9	0,389
6	15	9	6	10	9	0,233
7	13	8	5	10	9	0,244
8	12	8	4	10	9	0,356
9	11	7	4	10	9	0,256
10	12	8	4	10	9	0,356

Test No	Number of Corrections	BA	BB	JA	JB	D
11	13	8	5	10	9	0,244
12	9	6	3	10	9	0,267
13	14	8	6	10	9	0,344
14	12	7	5	10	9	0,366
15	15	10	5	10	9	0,444
16	15	9	6	10	9	0,233
17	12	8	4	10	9	0,356
18	13	8	5	10	9	0,244
19	14	9	5	10	9	0,344
20	15	10	5	10	9	0,444

From the test of the differential power of the question, it was found that the question had a differential power at a moderate and good level, namely in the range of 0.20 - 0.40 and 0.40 - 0.70, so it could be accepted. Furthermore, the instrument can be used to collect research data.

After the research, data was obtained from pretest and posttest findings from each experimental and control class student. Furthermore, researchers tested the following normality and homogeneity tests presented in tabular form:

Table 7. Normality Test

Experimental Class Pretest						Experiment Class Posttest				
no	**x**	**z**	**F(z)**	**S(z)**	**IF(z)-S(z)l**	**x**	**z**	**F(z)**	**S(z)**	**IF(z)-S(z)l**
1	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
2	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
3	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
4	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
5	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
6	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
7	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
7	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
8	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
9	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
10	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
11	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
12	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
13	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
14	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
15	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16

16	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
17	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
18	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
19	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
20	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
21	35	22,68265	1	0,84	0,16	**90**	35,36614	1	0,84	0,16
22	40	27,68265	1	0,92	0,08	**95**	40,36614	1	0,96	0,04
23	40	27,68265	1	0,92	0,08	**95**	40,36614	1	0,96	0,04
24	45	32,68265	1	1	0	**95**	40,36614	1	0,96	0,04
25	45	32,68265	1	1	0	**100**	45,36614	1	1	0

Control Class Pretest

no	x	z	F(z)	S(z)	IF(z)-S(z)l
1	35	22,49074	1	0,85	0,15
2	35	22,49074	1	0,85	0,15
3	35	22,49074	1	0,85	0,15
4	35	22,49074	1	0,85	0,15
5	35	22,49074	1	0,85	0,15
6	35	22,49074	1	0,85	0,15
4	35	22,49074	1	0,85	0,15
7	35	22,49074	1	0,85	0,15
8	35	22,49074	1	0,85	0,15
9	35	22,49074	1	0,85	0,15
10	35	22,49074	1	0,85	0,15
11	35	22,49074	1	0,85	0,15
12	35	22,49074	1	0,85	0,15
13	35	22,49074	1	0,85	0,15
14	35	22,49074	1	0,85	0,15
15	35	22,49074	1	0,85	0,15
16	35	22,49074	1	0,85	0,15
17	35	22,49074	1	0,85	0,15
18	35	22,49074	1	0,85	0,15
19	35	22,49074	1	0,85	0,15
20	35	22,49074	1	0,85	0,15
21	35	22,49074	1	0,85	0,15
22	35	22,49074	1	0,85	0,15
23	40	27,49074	1	0,92	0,08
24	40	27,49074	1	0,92	0,08
25	45	32,49074	1	1,00	0,00

Control Class Posttest

x	z	F(z)	S(z)	IF(z)-S(z)l
50	-4,63386	1,79E-06	0,12	0,12
50	-4,63386	1,79E-06	0,12	0,12
50	-4,63386	1,79E-06	0,12	0,12
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
60	5,366144	1	0,84	0,16
65	10,36614	1	0,92	0,08

26	45	32,49074	1	1,00	0,00	**65**	10,36614	1	0,92	0,08
						70	15,36614	1	0,96	0,04
						75	20,36614	1	1,04	0,04
						75	20,36614	1	1,04	0,04

Group	***LCounter***		***Ltable***	**Criteria**	**Description**
	Pretest	**Posttest**			
Experiment (VA)	**0,160**	**0,160**	**0,173**	***L Counter* < *Ltable***	**Normal**
Control (VB)	**0,153**	**0,160**			

Normality testing was carried out using the Liliefors test. In this test, the criterion used is that the Liliefors value (L-count) must be smaller than the Liliefors table value (L-table) to indicate that the data comes from a normal distribution. In the case of the experimental and control groups, the number of students in each group was n = 25, and the test was conducted with a significance level of α = 0.05. The Liliefors table value obtained was 0.173 based on the data analysis of the pretest-posttest results given to both groups. The findings of the study, obtained from the pretest-posttest results for both groups, showed that the data distribution was normal.

Table 8. Homogeneity Test

standard deviation	2,935198	2,320477
f count	1,264911	
dk	24	25
a	0,05	
table	1,964	

F-Test Two-Sample for Variances

	35	*35*
Mean	36,2	36,15385
Variance	8,916667	8,615385
Observations	25	26
df	24	25
F	1,03497	
P(F<=f) one-tail	0,465352	
F Critical one-tail	1,964306	
fcount<ftable	**then h0 is accepted**	

standard deviation	2,457328	5,834859
count	2,374473	
dk	24	25
a	0,05	
table	1,964306	

F-Test Two-Sample for Variances

	90	*50*
Mean	91	61,15385
Variance	6,25	30,61538
Observations	25	26
df	24	25
F	0,204146	
P(F<=f) one-tail	0,000111	
F Critical one-tail	0,50634	
fcount<ftable	**then h0 is accepted**	

Group	*Fcount*		*Ftable*	Criteria	Description
	Pretest	Posttest			
Experiment (VA)	**0,103**	**0,204**	**1,964**	***Fcount< Ftable***	**Homogeneous**
Control (VB)					

If the data shows a normal distribution, the next step is conducting homogeneity testing. Homogeneity testing of the two data groups was carried out using the Fisher test, an important step in data analysis to determine whether the two groups are homogeneous. The criterion for homogeneity testing is if the F-count value is smaller than the F-table value. Based on the table presented, the data meets the predetermined criteria, so the null hypothesis (H0) is accepted, indicating that the two data groups have a homogeneous population.

Table 9. N Gain Score

Experiment Class

No	Pretest	Postest	Post - Pre	Ideal Score	N Gain	N Gain %
1	35	90	55	*65*	0,846154	84,61538
2	35	90	55	*65*	0,846154	84,61538
3	35	90	55	*65*	0,846154	84,61538
4	35	90	55	*65*	0,846154	84,61538
5	35	90	55	*65*	0,846154	84,61538
6	35	90	55	*65*	0,846154	84,61538
7	35	90	55	*65*	0,846154	84,61538
8	35	90	55	*65*	0,846154	84,61538
9	35	90	55	*65*	0,846154	84,61538
10	35	90	55	*65*	0,846154	84,61538
11	35	90	55	*65*	0,846154	84,61538
12	35	90	55	*65*	0,846154	84,61538
13	35	90	55	*65*	0,846154	84,61538
14	35	90	55	*65*	0,846154	84,61538
15	35	90	55	*65*	0,846154	84,61538
16	35	90	55	*65*	0,846154	84,61538
17	35	90	55	*65*	0,846154	84,61538
18	35	90	55	*65*	0,846154	84,61538
19	35	90	55	*65*	0,846154	84,61538
20	35	90	55	*65*	0,846154	84,61538
21	35	90	55	*65*	0,846154	84,61538
22	40	95	55	*60*	0,916667	91,66667

N-GAIN SCORE DIVISION

N-GAIN VALUE	CATEGORIES
g>0,7	High
0,3<g<0,7	Medium
g<0,3	Low

N-GAIN EFFECTIVENESS INTERPRETATION CATEGORY	
PERCENTAGE (%)	DESCRIPTION
<40	Ineffective
40-55	Less Effective
56-75	Effective Enough
>75	Effective

(Loka Son, 2019)

23	40	95	55	*60*	0,916667	91,66667	
24	45	95	50	*55*	0,909091	90,90909	
25	45	100	55	*55*	1	100	
Mean	36,2	91	54,8	63,8	0,8604664	86,046616	

Based on the results of the N-gain score calculation above, it is concluded that the average N-gain score for the experimental class (using hologram media) is 86, 046616 or around 86.04%, which is included in the effective category of more than 75%. Therefore, it can be concluded that both hologram learning media effectively improve learning outcomes in the IPAS subject with material on the layers of the earth in class V of Wonosari State Elementary School, Semarang City, in the 2023/2024 school year.

Furthermore, to find out whether the difference in the level of effectiveness of learning using hologram media (experimental class) and conventional learning (control class) is significant or not, the next step is required, namely hypothesis testing.

Table 10. Hypothesis testing

t-Test: Two-Sample Assuming Equal Variances

	55	*15*
Mean	54,8	25
Variance	1	12
Observations	25	26
Pooled Variance	6,612244898	
Hypothesized Mean Difference	0	
df	49	
t Stat	41,37265477	
P(T<=t) one-tail	4,46699E-40	
t Critical one-tail	1,676550893	
P(T<=t) two-tail	8,93398E-40	
t Critical two-tail	2,009575237	

Group	***t-count***	***t-table***	**Criteria**	**Description**
Experiment (VA)	**41,37**	**2,009**	***t-count> t-table***	**H1 accepted**
Control (VB)				

The data was then analyzed using hypothesis testing, where the t-test was used to compare the difference between the experimental and control classes that received conventional learning. The

purpose of this analysis is to determine whether the effect is significant. The degree of freedom (dk) was calculated by subtracting the number of students in the experimental class from the number of students in the control class. The calculation results show that the t-count value is 41.37 with a significance level of $\alpha = 0.05$ and dk = 49. The t-table value obtained is 2.009. From this result, it can be concluded that 41.37 > 2.009 indicates that the t-count value is greater than the t-table value. This indicates that the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. Thus, it can be concluded that using holographic learning media to teach Natural and Social Sciences (ESS) in grade V of Wonosari 01 State Elementary School, especially on the material of the earth's layers, provides better results than conventional ESS teaching.

Figure 1

Figure 2

While using hologram media, students can answer questions correctly and precisely on the hologram question board in pictures A and b. It can be seen that students are observing hologram media about the layers of the earth. This research, just like the research done by (Deril Sukma & Dyah, 2020) in the study obtained results and proved that using 3D Mica Hologram learning media in teaching science to fifth-grade elementary school students proved effective in improving concept understanding. In addition, there was a significant increase in the average value of student learning outcomes after the application of 3D Mica Hologram learning media compared to the previous value. In the pre-cycle stage, the average score was 69.3, with a class completeness rate of 38%. After the hologram media intervention in cycle 2, the average score increased to 76, with a class completion rate of 55%. Although it has not reached the minimum completeness of 80%, the research continued to the action stage in cycle 2. At this stage, the average score was 86, and the class completeness level reached 88%. There was an increase in learning completeness of 17% from the pre-cycle stage to cycle 1 and 33% from cycle 1 to cycle 2. Using holographic learning media increases students' enthusiasm for learning because it presents interesting visuals, stimulating students' interest and motivation. Educators are expected to be able to utilize various types of hologram learning media by the material being taught. In addition, the results of classroom observations and interviews with teachers show students' positive responses to using this learning media, especially because it involves

interesting three-dimensional visualizations.

Discussion

This study's results indicate that hologram media use in learning grade V earth layer material is more effective than the conventional approach. There is a difference in scores between students who experience learning using hologram media and students who follow conventional learning. The cognitive scores of students who used hologram media were higher than those who followed conventional learning. Students who used hologram media significantly improved compared to those who followed conventional learning. This is also in line with research conducted by (Hasyim, 2019).

Students who use hologram media can more quickly understand the material of the earth's layers because it can show objects as if they are real and can be observed. This is in line with Jean Piaget's development theory (Wahyuni et al., 2022), which states that there are four stages of cognitive development in the learning process. This theory states that the stages of learning development are sensory-motor, pre-operational, concrete operations, and formal operations. In general, children are between 6-12 years old. At the age of 6-12 years, children are in the concrete operation period, where they will think logically about concrete objects and can use their mentality to solve concrete problems. In this case, the use of learning media is needed, especially at the elementary school level, because in this phase, children are not yet able to think abstractly and still need media that helps in the process of understanding IPAS concepts that are difficult to exemplify in real life during learning, so the use of holographic learning media is by this theory.

In the learning process, students were divided into groups, each provided with a mobile phone with a full HD screen and given an additional device in the form of a hologram box made of acrylic glass to reflect the light from the mobile phone. After seeing this media, students showed increased interest and were more focused on the material presented. This caused them to be more confident in doing the questions, showing better individual ability.

This study's results confirm that hologram media use in learning the layers of the earth positively impacts students' understanding of the material, compared to conventional methods. This indicates that the media can be used as an alternative to increase students' interest in learning materials. Thus, students' understanding of learning materials is expected to increase, positively impacting their learning outcomes and cognitive abilities.

The advantage of using hologram media in learning is that learning activities no longer depend on the role of the teacher as the center, but students are expected to be more active in following the audio and images presented through the media; this is also in line with the results of the study

(Arifudin et al., 2019). Because hologram media is something new for students, their interest in learning increases, and they can better understand the material presented. The unique display of light reflections that form objects is a special attraction for students, as it can increase their absorption of learning.

CONCLUSION

The results and discussion above show that the use of hologram learning media is effective in learning, especially on the material of the earth's layers in the IPAS subject for grade V students at Wonosari 01 Elementary School in Semarang City. This finding is supported by data and statistical analysis showing a positive increase in learning outcomes after using hologram media compared to conventional learning methods. This study concluded that hologram learning media can significantly improve student learning outcomes, with an average score that increased from pretest 36.15 to posttest 91.00 and a normalized gain percentage of 86.04%. This significantly increases student learning outcomes after using hologram learning media. Thus, using hologram media to learn the material of the earth's layers proved effective in the fifth grade of Wonosari 01 Elementary School in Semarang City, as well as encouraging students' overall interest in learning to achieve better learning outcomes.

REFERENCES

Adaweyah, Z., Munzil, M., & Mulyati, Y. (2023). Pengembangan media pembelajaran berbasis 3d hologram pada materi pembelahan sel pada manusia untuk kelas ix SMP. *Proceedings of Life and Applied Sciences*, *1*.

Antasari, A. R. S. (Universitas I. N., Keguruan, F. T. D., & Ibtidaiyah), J. P. G. M. (2021). *Pengaruh Media Holographic Pyramid Pada Hasil Belajar Siswa Pembelajaran Tematik Kelas Vi Di Mi Sullamut Taufiq*.

Arifudin, A., Kuswandi, D., & Soepriyanto, Y. (2019). Pengembangan Media Obyek 3 Dimensi Digital Sel Hewan dan Tumbuhan Memanfaatkan Piramida hologram Untuk MTS. *Kajian Teknologi Pendidikan*, *2*(1), 9–15.

Arsyad, M. N., & Fatmawati, F. (2018). Penerapan Media Pembelajaran Berbasis Multimedia Interaktif Terhadap Mahasiswa IKIP Budi Utomo Malang. *Agastya: Jurnal Sejarah Dan Pembelajarannya*, *8*(2), 188. https://doi.org/10.25273/ajsp.v8i2.2702

Aslam, Wahab, A. A., Purrohman, P. S., Zulherman, & Ampry, E. S. (2021). Internet User Behavior and Social Media in Learning. *Proceedings of the 4th International Conference on Research of Educational Administration and Management (ICREAM 2020), 526*(Icream 2020), 50–55. https://doi.org/10.2991/assehr.k.210212.010

Della, A., Putri, H., Hunaifi, A. A., & Wiguna, F. A. (2022). Pengembangan Media 3D Hologram pada Pembelajaran PPKn Materi Hubungan antara Simbol dan Sila-Sila Pancasila untuk Siswa Kelas II Sekolah Dasar. *Jurnal Pendidikan Tambusai*, *6*(1), 849–856.

Deril Sukma, Y., & Dyah, L. (2020). Jurnal perseda. *Jurnal Persada*, *4*(2), 60–67.

Ferdiansyah, Z. D., Kuswandi, D., & Soepriyanto, Y. (2022). Pengembangan Objek 3D Memanfaatkan Piramida Hologram Berbasis Smartphone Materi Sistem Gerak Manusia. *JKTP: Jurnal Kajian Teknologi Pendidikan*, *5*(1), 72–80. https://doi.org/10.17977/um038v5i12022p072

Festiawan, R. (2020). Belajar dan pendekatan pembelajaran. *Universitas Jenderal Soedirman*, 1–17.

Hasyim, U. A. F. (2019). *Penggunaan media hologram pada pembelajaran ips kelas iv di mi ma'arif patihan wetan*. 0–62.

Hutapea, R. H. (2019). Instrumen Evaluasi Non-Tes dalam Penilaian Hasil Belajar Ranah Afektif dan Psikomotorik. *BIA': Jurnal Teologi Dan Pendidikan Kristen Kontekstual*, *2*(2), 151–165. https://doi.org/10.34307/b.v2i2.94

Indonesia, R. (2003). *Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 Tentang Sistem Pendidikan Nasional Dengan Rahmat Tuhan Yang Maha Esa Presiden Republik Indonesia*. Jakarta.

Jayaputra, A., Tolle, H., & Wardhono, W. S. (2017). *Penerapan Mixed Reality Sebagai Sarana Pembelajaran Indera Penglihatan Manusia Menggunakan Teknologi Hologram*. *1*(9), 715–722.

Loka Son, A. (2019). Instrumentasi Kemampuan Pemecahan Masalah Matematis: Analisis Reliabilitas, Validitas, Tingkat Kesukaran Dan Daya Beda Butir Soal. *Gema Wiralodra*, *10*(1), 41–52. https://doi.org/10.31943/gemawiralodra.v10i1.8

Lukman, A., Hairi, A. P., Rahmi, A., Fadli, A., Dongoran, S. B., & Nasution, A. A. (2020). Penerapan Media Pembelajaran Holo-Math (Hologram Mathematics) Dalam Meningkatkan Kemampuan Visual Matematis Siswa Di SMP Negeri 8 Percut Sei Tuan. *Jurnal Fibonaci: Jurnal Pendidikan Matematika*, *1*(2). https://doi.org/10.24114/jfi.v1i2.21902

Muasyaroh, H., Kusuma, R. S., & Andriani, M. W. (2022). Pengembangan Media Hologram Untuk Mengenalkan Sejarah Perjuangan Bangsa Indonesia Pada Siswa Kelas VI SD Muhammadiyah 1 Bangkalan. *Jurnal Ilmiah Mandala Education*, *8*(3), 2003–2011. https://doi.org/10.58258/jime.v8i3.3558

Paramita, N. (2021). *Pengembangan media pembelajaran IPA berbasis aplikasi android berbantuan hologram 3d pada materi sistem pernapasan manusia* (Doctoral dissertation, Universitas Negeri Malang).

Rochmania, D. D., & Restian, A. (2022). Pengaruh Penggunaan Media Belajar Video Animasi Terhadap Proses Berfikir Kreatif Siswa Sekolah Dasar. *Jurnal Basicedu*, *6*(3), 3435–3444. https://doi.org/10.31004/basicedu.v6i3.2578

Septiana, A. I., Anggraini, D., & Syawanodya, I. (2020). Pengembangan Multimedia Interaktif Menggunakan Piramida Hologram Untuk Media Pembelajaran Bangun Ruang Di Sekolah Dasar. *Jurnal Instek Infromatika Saint Dan Tekonologi*, *5*(2), 261–268.

Soepriyanto, Y., Sihkabuden, S., & Surahman, E. (2018). Pengembangan Obyek 3d Digital Pada Meja Piramida Hologram Untuk Pembelajaran Kelas. *Jurnal Kajian Teknologi Pendidikan*, *1*(4), 333-339.

Sugiyono, P. (2019). *Metodologi penelitian pendidikan (kualitatif, kuantitatif dan mixed method)*.

Tahun, E. X. V. I., Xii, D. M., Telp, S., & Iii-b, N. D. (2023). *Universitas pgri adi buana surabaya 2023*. *4*(2), 874–880.

Wahyuni, D., Muntari, M., & Anwar, Y. A. S. (2022). Analisis Kemampuan Berpikir Logis Siswa Kelas XI MIPA SMA Negeri di Praya Selama Pembelajaran Daring. *Chemistry Education Practice*, *5*(1), 10–16. https://doi.org/10.29303/cep.v5i1.2788

Wibowo, D. C., Ocberti, L., & Gandasari, A. (2021). Studi Kasus Faktor-Faktor Yang Mempengaruhi Hasil Belajar Matematika Di Sd Negeri 01 Nanga Merakai. *Jurnal Ilmiah Aquinas*, *4*(1), 60–64. https://doi.org/10.54367/aquinas.v4i1.974

Wicaksana, A., & Rachman, T. (2018). Penyajian Data dan Analisis. *Angewandte Chemie International Edition, 6(11), 951–952.*, *3*(1), 10–27. https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf