

***The Influence of Student Interest in  
Types of Three Dimensional Learning Media on  
Student Interest in STEAM Based Three Dimensional Learning***

**Agus Maqruf\*<sup>1</sup>; Dadan Dasari<sup>2</sup>**

<sup>1,2</sup>Program Studi Pendidikan Matematika, FPMIPA  
Universitas Pendidikan Indonesia  
agusmaqruf@upi.edu\*<sup>1</sup>, dasari@upi.edu<sup>2</sup>

***Abstract***

This research aims to investigate the influence of interest in three-dimensional learning media on class XII high school students' interest in three-dimensional learning based on STEAM (Science, Technology, Engineering, Arts and Mathematics). Data was collected through a student response survey, which included questions about their level of interest in three-dimensional learning media and STEAM-based three-dimensional learning. This research aims to contribute to a practical understanding of learning media preferences for the implementation of STEAM-based three-dimensional learning at the high school level. These results can be the basis for developing learning media that are more innovative and relevant to student preferences, with a focus on increasing student interest and participation in STEAM-based learning. Data analysis shows that students' interest in three-dimensional real media and three-dimensional application media can influence students' interest in STEAM-based three-dimensional learning. These results provide a clearer picture that three-dimensional real media and three-dimensional application media can stimulate students' interest in exploring and understanding STEAM concepts.

***Keywords:*** *Media; Three Dimensions; and STEAM.*

***Abstrak***

Penelitian ini bertujuan menyelidiki pengaruh ketertarikan media pembelajaran dimensi tiga terhadap ketertarikan siswa SMA kelas XII pada pembelajaran STEAM (Science, Technology, Engineering, Arts, dan Mathematics). Data dikumpulkan melalui survei respon siswa, yang mencakup pertanyaan tentang tingkat ketertarikan mereka terhadap media pembelajaran berdimensi tiga dan pembelajaran berbasis STEAM. Hasil ini dapat menjadi dasar untuk pengembangan media pembelajaran yang lebih inovatif dan relevan dengan preferensi siswa, dengan fokus pada peningkatan minat dan partisipasi siswa pada pembelajaran berbasis STEAM. Hasil penelitian menunjukkan bahwa penggunaan media pembelajaran dimensi tiga secara signifikan mempengaruhi ketertarikan siswa terhadap pembelajaran STEAM. Analisis data menunjukkan bahwa ketertarikan siswa pada jenis media dimensi tiga dapat mengklasifikasikan ketertarikan siswa pada media dimensi tiga berbasis STEAM. Hasil ini memberikan gambaran yang lebih jelas bahwa media dimensi tiga dapat merangsang minat siswa dalam menjelajahi dan memahami konsep-konsep STEAM.

***Kata Kunci:*** *Dimensi Tiga; Media; dan STEAM.*

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\*Correspondence:

Email: [agusmaqruf@upi.edu](mailto:agusmaqruf@upi.edu)

## INTRODUCTION

The transformation of 21st century education raises new challenges that require close alignment between science, technology, engineering, arts and mathematics (STEAM) in learning. STEAM-based learning is a learning approach that emphasizes the relationship between *science, technology, engineering, art* and *mathematics* (STEAM) knowledge and competencies to solve problems. The aim of STEAM-based learning is so that students' understanding and knowledge regarding *science, technology, engineering, art* and *mathematics* can increase, so that this understanding can be used to solve problems and make decisions for human progress (Sa'ida, 2021). With the *art element*, it is hoped that through STEAM students will get used to solving problems in a creative way. Modern educational practices tend to integrate domains previously considered distinct and separate. In recent years, the term STEM has been associated with the fields of science, technology, engineering, and mathematics education. However, once STEM was established as a practical way to refer to these four fields in a concise acronym, experts urged further expansion to include the arts and the term STEAM was born (Khine & Areepattamannil, 2019).

Initially, there was only a STEM approach introduced by the United States *National Science Foundation* (NSF) in the 1990s. Much global attention has been given to integrating practical STEM education (Cheng et al., 2022). The arts can serve as a springboard for infusing traditionally taught STEM subjects with the kind of creative thinking that drives innovation. STEAM will help advance STEM teaching and even improve pedagogy in general, moving students toward more creative and innovative ways of thinking (Stewart et al., 2021). Furthermore, STEAM supports 21st century learning competencies because the implementation of STEAM-based learning is relevant to the direction of developing students' 21st century learning competencies, namely *critical thinking, creativity, collaboration* and *communication*. (Aguayo et al., 2023; Cheng et al., 2022; Stewart et al., 2021; Vicente & Llinares, 2020; Zayyinah et al., 2022).

One of the key factors that can support STEAM integration is the use of learning media. Different types of learning media offer different approaches in

conveying information, stimulating understanding, and increasing student participation. The types of learning media include various formats, from traditional to cutting-edge technology, and each type has its own advantages and disadvantages. Conventional approaches such as textbooks and blackboards have given rise to more dynamic forms of media, such as visual, audio and multimedia. In addition, digital technology opens the door to new innovations such as interactive media, simulations and virtual reality. A deep understanding of various types of learning media is very important in designing learning experiences that are effective and relevant to students' needs.

Furthermore, one of the materials in high school that is closely related to learning media is geometry material, especially geometric figures. One of the spatial construction materials that is considered the most complex at the high school level is three-dimensional material. This is relevant to several studies which show that three-dimensional material gives students many problems in solving the problem of lack of real projection (Novita et al., 2018; Pujakusuma et al., 2019; Şefik & Dost, 2020). The third dimension of mathematics is the science that studies the elements of construct space such as size, point, distance, and angle. Along with advances in technology, various learning media are increasingly being used, including in class XII high school mathematics material, namely three dimensions. This triggers questions regarding student preferences in choosing three-dimensional learning media and its impact on student interest and participation in STEAM learning. When we investigate the relationship between interest in three-dimensional learning media and STEAM learning, there are complex dynamics that are worth understanding. Three-dimensional learning media offers an environment that allows students to explore STEAM concepts in a more visual, practical, and in-depth way. However, the extent to which interest in this type of learning media can spread and change students' interest in STEAM learning as a whole needs to be detailed. This research details how students' interest in three-dimensional learning media influences students' interest in STEAM-based third-dimensional learning.

## **RESEARCH METHODS**

This research includes quantitative research. Quantitative research, according to the guidelines provided by John W. Creswell, represents a systematic approach to compiling, collecting, and analyzing data in the form of numbers or statistics (Creswell, 2013). This research will present an analysis of the influence of students' interest in dimensional learning media on students' interest in STEAM-based three-dimensional learning. In this research, researchers act as planners, implementers, data collectors, data interpreters, and reporters of research results. Activities carried out by researchers include making instruments in online form, collecting data via online form for students, analyzing data, making conclusions, and making research reports. The subjects used in this research were class XII high school students in Indonesia who had studied three-dimensional material. Respondents in this study were 180 Class XII SMA/MA students who have studied three-dimensional material. Research instruments are tools used by researchers to collect data (Creswell, 2013). Then, the instrument used in this research is an online form of student interest in three-dimensional media and STEAM which is available at the link <https://bit.ly/steamdimentsitiga>. The online form contains a choice of students' level of interest in three-dimensional learning media, namely real media, audio-visual media (video), application media, and visual media (teaching materials). Levels of interest include: very disinterested, not interested, neutral, interested, and very interested. Furthermore, at the end of the instrument, there is a choice of level of student interest in STEAM-based learning with the level of interest including: not interested and interested. The types of media offered to students are described clearly so as to provide a clear picture for students who will act as respondents.

Next, this research hypothesis will be tested using logistic regression analysis assisted by SPSS. This aims to answer the research question, namely the influence of two or more independent variables on the independent variable. Before conducting a hypothesis test, the prerequisite tests must first be met, namely overall model *fit*, model feasibility test based on the results of the Hosmer and Lemeshow Test. Furthermore, in hypothesis testing, the Wald (t) test basically

shows how far the independent variable partially influences the dependent variable. To determine the Wald test value, the significance level is 5%. The decision making criteria are: if the p-value  $> 0.05$  then  $H_0$  is accepted, meaning one of the independent variables does not influence the dependent variable, but if the p-value  $< 0.05$  then  $H_0$  is rejected, meaning one of the independent variables influences the dependent variable (Ghozali, 2018).

There are 4 hypotheses that can be formulated in this research, namely:

1. The influence of students' interest in three-dimensional real media types on students' interest in STEAM-based three-dimensional learning;
2. The influence of students' interest in three-dimensional visual media on students' interest in STEAM-based three-dimensional learning;
3. The influence of students' interest in three-dimensional audio-visual media on students' interest in STEAM-based three-dimensional learning;
4. The influence of students' interest in types of three-dimensional application media on students' interest in STEAM-based three-dimensional learning.

## RESULTS AND DISCUSSION

In this research, data was collected from 180 respondents including class XII SMA/MA/SMK students who had studied three-dimensional material. This data contains respondents' interest in types of learning media for third-dimensional material and respondents' interest in STEAM-based third-dimensional learning. The analysis was carried out using SPSS-assisted logistic regression, as follows:

### 1. Case Processing Summary

**Table 1. Case Processing Summary**

Unweighted Cases <sup>a</sup>		N	Percent
Selected Cases	Included in Analysis	180	100.0
	Missing Cases	0	.0
	Total	180	100.0
Unselected Cases		0	.0
Total		180	100.0

a. If weight is in effect, see classification table for the total number of cases.

Based on Table 1, the data in this study is 180 and there are no *missing cases* so that all data can be processed in this study.

## 2. Classification Table (Classification Table)

**Table 2. Classification Table** <sup>a, b</sup>

	Observed	Predicted			
		STEAM		Percentage Correct	
		Not interested	Interested		
Step 0	STEAM	Not interested	0	16	.0
		Interested	0	164	100.0
		Overall Percentage			91.1

a. Constant is included in the model.

b. The cut off value is ,500

Based on Table 3, *the overall percentage* before the independent variable is entered is 91.1%, which means 91.1% (164) students are interested and 8.9% (16) students are not interested in STEAM-based three-dimensional learning.

## 3. Iteration History (Iteration History)

**Table 3. Iteration History** <sup>a,b,c,d</sup>

Iteration		-2 Log likelihood	Coefficients				
			Constant	Real	Visual	Audio visual	Application
Step 1	1	98,709	-.700	,421	.118	-.152	,444
	2	78,947	-2,040	,792	,234	-.308	,864
	3	74,842	-2,948	1,043	,318	-.439	1,172
	4	74,459	-3,323	1,150	,351	-.495	1,302
	5	74,453	-3,376	1,166	,355	-.502	1,320
	6	74,453	-3,377	1,166	,355	-.502	1,321

a. Method: Enter

b. Constant is included in the model.

c. Initial -2 Log Likelihood: 74.453

d. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Based on Table 3 above, which is a table of iteration history when the independent variable was not included (in block 1), we obtained a value of -2 Log Likelihood: 74.453. If we compare it with the Chi Square value when

degrees of freedom  $DF=N$ -Number of Independent Variables=176 and probability  $P=0.05$ , then  $-2 \text{ Log Likelihood value: } 74.453 < \text{Chi Square value: } 207.955$  shows that after entering the independent variables, the model fits the data.

#### 4. Omnibus Test

**Table 4. Omnibus Tests of Model Coefficients**

		Chi-square	Df	Sig.
Step 1	Step	33,532	4	,000
	Block	33,532	4	,000
	Model	33,532	4	,000

Based on Table 4, the significance value is  $<0.05$ , which means the model can be said to be fit or in other words the addition of independent variables has a real influence on the model.

#### 5. Hosmer and Lemeshow Test

**Table 5. Hosmer and Lemeshow Test**

Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
1	5,172	5	,395

Based on Table 5, the Chi Square Hosmer and Lemeshow test value is:  $5.172 < \text{Chi Square table value: } 11.070$  (when  $df$  5 and probability  $P = 0.05$ ) or it can be seen from the significance value in the table  $0.395 > 0.05$  which means there is no difference significant relationship between the model and the observations so that hypothesis testing can be carried out.

#### 6. Classification Results ( Classification Results )

**Table 6. Classification Table <sup>a</sup>**

	Observed	Predicted			Percentage Correct
		STEAM			
		Not interested	Interested		
Step 1	STEAM	Not interested	5	11	31.3
		Interested	0	164	100.0
Overall Percentage					93.9

a. The cut off value is ,500

Based on Table 6, after the independent variables were entered, the results showed that there were 16 students who were not interested in STEAM-based three-dimensional learning with a classification of 5 students who were not interested and 11 students who should not be interested but were interested. Then there were 164 students who were interested in STEAM-based three-dimensional learning, with all of these students really being interested in STEAM-based three-dimensional learning. Based on table 6, the accuracy of the research model is also found to be 93.9%.

## 7. Logistic Regression Models and Hypothesis Testing

In the SPSS output, the output results for the coefficient are as follows:

**Table 7. SPSS Output Variables in the Logistic Regression Equation**

		Variables in the Equation					
		B	S.E	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	Real	1,166	,575	4,112	1	,043	3,209
	Visual	,355	,597	,353	1	,552	1,426
	Audio visual	-.502	,461	1,186	1	,276	,605
	Application	1,321	,476	7,688	1	,006	3,746
	Constant	-3,377	1,358	6,186	1	.013	,034

a. Variable(s) entered on step 1: Real, Visual, AudioVisual, Application.

Based on Table 7, we can decide from the 4 hypotheses formulated, namely:

### 1. First hypothesis on $X_1$ (Real Media)

$H_0$ : There is no influence of students' interest in three-dimensional real media types on students' interest in STEAM-based three-dimensional learning.

$H_1$ : There is an influence of students' interest in three-dimensional real media types on students' interest in STEAM-based three-dimensional learning.

From the table, the p value  $<0.05$  is obtained so that  $H_0$  is rejected, which means that there is an influence of students' interest in three-dimensional real media types on students' interest in STEAM-based three-dimensional learning. This is in line with research by Siregar et al (2023 and Vira &



Putri (2020) where there is a connection between real media and project learning that is relevant to STEAM.

2. Second hypothesis on  $X_2$  (Visual Media)

$H_0$ : There is no influence of students' interest in three-dimensional visual media on students' interest in STEAM-based three-dimensional learning.

$H_1$ : There is an influence of students' interest in three-dimensional visual media on students' interest in STEAM-based three-dimensional learning.

From the table, the p value  $> 0.05$  is obtained so that  $H_0$  is accepted, which means there is no influence of students' interest in three-dimensional visual media types on students' interest in STEAM-based three-dimensional learning. This is in line with research by Mursalim and Rumberak (2019) which states that one of the factors that makes students less interested in learning, especially practical learning that is relevant to STEAM, is visual media or teaching materials or LKPD which are made less attractive to students (Mursalim & Rumberak, 2021).

3. Third hypothesis on  $X_3$  (Audio Visual Media)

$H_0$ : There is no influence of students' interest in three-dimensional audio-visual media types on students' interest in STEAM-based three-dimensional learning.

$H_1$ : There is an influence of students' interest in three-dimensional audio-visual media on students' interest in STEAM-based three-dimensional learning.

From the table, the p value  $> 0.05$  is obtained so that  $H_0$  is accepted, which means there is no influence of students' interest in three-dimensional audio-visual media types on students' interest in STEAM-based three-dimensional learning. This is in line with research by Ramadhina and Rohman (2022) which shows that there are several problems with the use of audio-visual media (video) which reduce students' interest in learning, especially practical learning relevant to STEAM (Ramadhina & Rohman, 2022).

4. Fourth hypothesis on  $X_4$  (Application Media)

$H_0$ : There is no influence of students' interest in the type of three-dimensional application media on students' interest in STEAM-based three-dimensional learning.

$H_1$ : There is an influence of students' interest in the type of three-dimensional application media on students' interest in STEAM-based three-dimensional learning.

From the table, the p value  $<0.05$  is obtained so that  $H_0$  is rejected, which means that there is an influence of students' interest in the type of three-dimensional application media on students' interest in STEAM-based three-dimensional learning. This is in line with research by Herawati et al. (2022); and Vira & Putri, (2020) where there is a connection between application media and project learning that is relevant to STEAM.

Based on Table 7, the logistic regression model is also obtained in terms of the independent variables that have a significant effect, namely:

$$\text{Logit}\left(\frac{\pi}{1-\pi}\right) = -3,377 + 1,166X_1 + 1,321X_4$$

From the findings obtained, it was found that the data that was successfully analyzed was data on interest in three-dimensional media types and data on interest in STEAM-based three-dimensional media. The final results of the logistic regression test show that the model is 93.9% accurate, thus showing the results that students' interest in certain types of third-dimensional media can classify students' interest in STEAM-based third-dimensional media so that students' interest in certain types of third-dimensional media influences students' interest in media. STEAM-based three-dimensional. This is in line with several studies which show that interest in types of learning media is closely related to interest in project-based learning which is relevant to STEAM learning (Herawati et al., 2022; Siregar et al., 2023; Vira & Putri, 2020).

## CONCLUSION

The conclusion of this research is that students' interest in types of real media and applications in three-dimensional learning has an influence on students' interest in STEAM-based three-dimensional learning. The student response survey shows that students' interest in STEAM-based three-dimensional learning media is influenced by the type of three-dimensional media used. This research provides an important contribution to the practical understanding of student preferences for the implementation of STEAM-based three-dimensional learning media at the high school level. The results can be used as a basis for developing learning media that are more innovative and relevant to student preferences, with a focus on increasing student interest and participation in STEAM-based learning. This conclusion provides a clearer picture that the use of real media and three-dimensional application media can stimulate students' interest in exploring and understanding STEAM concepts, so that it can become a guide for policy makers and curriculum developers in improving the quality of STEAM learning at the high school level.

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