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The Practicality and Effectivity of Audiovisual Media Usage in Increasing Learning Output of Drawing Polygon

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Abstract

This research aimed to analyze the practicality and effectivity level of audio-visual usage in drawing polygon that developed by using Microsoft PowerPoint application and tested in state vocational (SMK N) 2 Kudus. The present research included research and development with applied ADDIE. The product was validated by media and material experts. The result of validation stated that the developed media in this research was valid and reliable based on the Content Validity Ratio, Content Validity Index, and Percent of Agreement. The product was practical with Ke= 0,93, and it was higher than the practical standard (0,90). This result was strengthened from the scalability test (Ks= 0,60), and the product achieved Ks=0,70 of the scalability. This result was higher than the required standard (Ks= 0,60). In the N-Gain score, the product got 71,34% or quite effective. The F count achieved 0,192 with Sig. (2-tailed) 0.000 < 0.05. This test showed a difference in average scores between the experiment and control class.

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INTRODUCTION

The Corona Virus has attacked around the world including Indonesia. This virus spread in Indonesia in March 2020 until now. This condition affected the education world and forced all learning processes must be done at home or learning distance as mentioned in education ministry letter number 4, the year 2020. It took anticipation to minimize the spreading of viruses, especially in the education environment. The policy made education institutions did not conduct teaching and learning processes such the normal situation for decreasing the viruses attack (Wargadinata et al., 2020).

Learning at home during the Covid-19 pandemic became a solution taken by the government to prevent time lost learning of students. The learning process is conducted at home by using technology and other supported tools (Herliandry et al., 2020). The students, teachers, and parents found some difficulties. The difficulties consisted of less communication, students' undisciplined in joining the class, lack of technology skills, and high internet cost (Khumaedi et al., 2021).

Vocational high school (SMK) was one of the education levels in Indonesia which aimed to create human sources who were ready to compete in the real world. One of my expertise in vocational high school was light vehicle engineering (TKRO). The subject in this competency was Engineering Drawing in the first year as C2 or as the subject of basic expertise competency. In the Engineering Drawing subject, the students had to pass the basic competency such as understanding geometry drawing construction and grouping geometry drawing construction based on geometry shape (Dirjendikdasmen, 2018). In this competency, the students will be taught how to draw the polygon.

Drawing polygon became one of the sub-competencies in engineering drawing, especially in the basic competency of geometry construction drawing. Based on observation at several vocational high schools in Kudus, this subject became a difficult subject and was commonly complained about by the students. Many students felt bored, unmotivated, and did not pay attention to the teacher's explanation in the learning process. The interview showed that the teacher found difficulty in explaining drawing polygon materials. Furthermore, the students tended to be passive in the class. However, it can be minimized by using suitable audiovisual media to integrate interactive media in the learning distance system (Zhang et al., 2006).

After analyzing the condition, the difficulty was influenced by several factors. The teacher's explanation is too flat and not interesting, improper lecture method, the usage of the media such as pictures did not explain material clearly, students tended to be passive in the class. Furthermore, the facility such as supported class conditions, advanced drawing tools, and learning media became the important thing that must be fulfilled by the school (Daryanto, 2013). The students' average score tended to be low since the teacher became the only learning source and the learning media that supported engineering drawing was limited. This condition resulted in students becoming passive. (Yudi Hermawan & WIiyanto Wibowo, 2018).

In line with the development of science and technology, learning media-based audio-visual became a crucial need. It was because the learning character and competency were complex. Asyhar (2021) explained that the learning process using audio-visual media need to be developed to increase the effectiveness in achieving learning purpose.

Agus (2009) stated that learning output was actions pattern, values, definitions, attitudes, appreciations, and skills: (1) verbal information, (2) intellectual skill, (3) cognitive strategy, (4) motoric skills, and (5) attitudes. Learning output is divided into three, there were (1) cognitive area, (2) affective area, and (3) psychomotor (Sudjana, 1995).

The factors that influenced learning output were a factor that came from his/herself (internal) and factors that came from outside (external) (Samino, 2011). External factors included learning facilities such as media, learning environment, and whether.

Ashaver (2013) elaborated on the importance of audio-visual media in the teaching and learning process, which covered senses and experiences. Audio-visual media supported students' participation, stimulated students'

interest, and became a learning source. Furthermore, the learning process with audio-visual helped and optimized the students to understand the concept, and it became a learning tool at the same time (Alshatri et al., 2019).

Based on the observation in State Vocational Highschool (SMK N) 2 Kudus, the engineering drawing subject was delivered based on a handout and textbook. The teacher used pictures through an LCD projector, demonstrated in the whiteboard, and did not apply video or audio to attract students' interest. This condition did not help the students to face drawing engineering that has been claimed as a difficult subject by the students.

The facility or infrastructures were lacking. The school only had a whiteboard and LCD projector in the class. The lack of learning media such as learning instruments with supported pictures and interactive media became the obstacles in shaping interactive learning. Monotonous learning by using handouts and textbooks cannot increase students' understanding and skills. Interactive audiovisual with colorful font, animations, explanation through automatic audio, can be used many times will add motivation, knowledge, and students' skills.

The implementation of audio-visual media hopefully can increase learners' understanding and skills. It was in line with Sofan Amri's (2010) research which stated that humans could absorb materials around 70% by doing, 50% by listening and watching (audio-visual), 30% by watching, 20% by listening, and 10% by reading.

Based on the explanation above, the catching phenomenon was how developing appropriate learning media in drawing polygon based on several aspects such as media, materials, practicality, effectivity so that it can develop students' achievements/ learning output.

The main reason to choose this topic was the time limit during the covid 19 pandemic. The Covid pandemic banned direct learning activity, teachers' lack of understanding in making audio-visual media, and 100% of students had a smartphone. Based on the explanation above, the researcher was interested to dig up the development of learning media. It is focused on the development of audio-visual media in geometry construction drawing subjects, especially in drawing polygon to increase students' achievement.

METHODS

This study was a research and development type of research. The characteristic of development research was handling the limitation and setting the goal, solving the problem, making a decision, thinking in uncertainty, exploring, and planning (Rusdi. 2018). Sugiyono (2016) stated that research and development (R&D) was a research methodology. It was used to gain the product and examine the effectiveness of the resulting product. Research and Development was mixed research between qualitative and quantitative research. This research adopted *Analysis, Design, Development, Implementation, and Evaluation*, or called the ADDIE model. This model was used to develop the product, learning strategy, learning media, media, and learning source.

The present study developed audio-visual media in drawing polygon at X Light Engineering Vehicle (TKRO). The qualitative approach was to know the practicality level and the quantitative approach was adopted to test the effectivity level.

Research procedure such as analyzing, designing, developing, implementing, and evaluating the product was done in this research. In the analyzing phase, the researcher analyzed the needs, infrastructures, curriculums, teachers, and students. In designing media, several steps were done, starting from designing flowcharts and storyboards, constructing materials, creating the background, pictures, video, and animation that included in developing learning media.

In the developing process, product process and product result were validated by materials and media experts. The result of expert judgment was analyzed by using *the Content Validity Ratio* (CVR) and *Content Validity Index* (CVI). CVR formula was purposed by Lawshe (1975) as follows

ne refers to the number of experts that stated the product was suitable. While *N* means numbers of experts who did the scoring toward the products. The criteria of *CVR* for ten experts was 0,62 (Lawshe, 1975).

CVI analysis was implemented by dividing *the CVR* score by the experts. Denise F. Polit (2006) explained that *CVI* is valid if the gained score achieves more than 0,80. The next step was reliability analysis. It aimed to measure *CVR* and *CVI* was dealt with by experts, and the reliability in the scoring process was judged as agreement (McHugh, 2012). Nurjannah & Siwi (2017) explained that the examiners measured the strength by counting the agreement among experts and divided it into all predicates. The percent of agreement formula can be seen as follows:

$$Percent\ Agreement = \frac{Agreement}{Agreement + Disagreement}\ x\ 100\%$$

The percent of agreement criteria was 0,80 (Suharsimi, 2006). From 10 validation that conducted by media, experts were analyzed by using CVR, CVI, and media expert reliability toward polygon drawing media.

Table 1. CVR, CVI validity and Media Expert Reliability

Indicators	Subject Matter Expert (SME)										Σ ne	CVR	Description	Agreement
	1	2	3	4	5	6	7	8	9	10				
Maintable	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Usable	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Compatible	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Operational	1	1	1	1	1	1	1	1	0	1	9	0.8	Valid	0.8
Reusable	1	1	1	1	1	1	1	1	1	0	9	0.8	Valid	0.8
Communication	0	1	1	1	1	1	1	1	1	1	9	0.8	Valid	0.8
Navigation	1	1	0	1	1	1	1	1	1	1	9	0.8	Valid	0.8
Audio	1	1	1	1	1	1	1	0	1	1	9	0.8	Valid	0.8
Visual	1	1	1	1	0	1	1	1	1	1	9	0.8	Valid	0.8
Animation and Pictures	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Σ	9	10	9	10	9	10	10	9	9	9	94	8.8	Valid	8.8
CVI Score												0.88	Valid	0.88

Based on the result above, the CVR score showed 0,8 – 1.0, and CVI achieved 0,88 or claimed as proper since it got more than 0,62 based on Lawshe's theory (1975). To measure CVR and CVI was agreed by experts, the reliability was counted by using *percent of agreement* (McHugh, 2012). The result was calculated by adopting the *percent of agreement* and got 88% or higher than the need criteria (80%) (Suharsimi, 2006). So, the result was stated reliable.

The validity result of materials by ten experts used CVR, CVI, and percent of agreement can be seen as follows.

Table 2. CVR, CVI and Materials expert Reliability

Indicators	Subject Matter Expert (SME)										Σ ne	CVR	Description	Agreement
	1	2	3	4	5	6	7	8	9	10				
Materials' suitability with syllabus	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Material clarity	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Material depth	1	1	0	1	1	1	1	1	1	1	9	0.8	Valid	0.8
Material coverage	1	1	1	1	1	0	1	1	1	1	9	0.8	Valid	0.8
Material coherence	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Material truth	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Materials' suitability with students	1	1	1	1	1	1	1	0	1	1	9	0,8	Valid	0.8
Easy to understand	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Delivering steps	1	1	1	1	1	1	1	1	1	1	10	1	Valid	1
Material structure	0	1	1	1	1	1	1	1	1	1	9	0.8	Valid	0.8
The example of picture explained the concept	1	1	1	1	1	1	0	1	1	1	9	0,8	Valid	0.8
Σ	10	11	10	11	11	10	10	10	11	11	105	10	Valid	10
CVI Score												0.91	Valid	0.91

The validation result of material experts showed 0,8 of CVR score until 1.0 with CVI score gained 0,91. In other words, the materials were stated as valid. Furthermore, the result of percent of agreement achieved 91% and declared as very reliable

The implementation phase was conducted for the students after the product was stated valid from the experts. Then, it was continued by evaluating the process at the end of the research. The evaluation process was applied by performance test to gain *pre-test* and *post-test.* Pre-test aimed to know the initial competency in the experiment class that consisted of students who use audio-visual media and control class that use a textbook. The result showed both classes had the same initial competency. After that, the researcher gave treatment in experiment class based on *Pre-test Post-test Control Group Design*. In the last step, the evaluation step was conducted by using a performance test.

The research subject was students of Light Vehicle Engineering (X TKRO) of State Vocational High School (SMK N) 2 Kudus that learn Engineering Drawing with base competency geometry construction and drawing polygon as sub-competency. The participants were divided into two, X TKRO 1 as experiment class and X TKRO 2 as control class. Both class categories got 36 participants.

Data collection techniques in this study were observation, questionnaires, and interviews. The observation technique was carried out to determine the feasibility of the media using an observation sheet. The practicality test used a questionnaire method for students and teachers. An observation and performance test instrument was used to test the effectiveness level.

Ten media experts filled the eligibility instrument as a media visibility test. The expert instruments were calculated using CVR and CVI to determine the validity of the media and materials. Furthermore, *Percent of Agreement* is used to determine the reliability of the instrument.

The media practicality test was determined by the reproducibility coefficient score (Kr) and the scalability coefficient (Ks). The qualitative descriptive analysis technique was used to analyze the practicality of the media. Teachers' and students' questionnaires became the data to analyze the practicality level of the media. The formula for the reproducibility coefficient (Kr) is as follows.

$$Kr = 1 - \frac{e}{n}$$

e refers to the participants' number who chose 'No' and *n* is the number of questions multiplied by the number of respondents. After *the Kr score* was found out, the researcher calculated the value of the scalability coefficient by using a formula.

$$Ks = 1 - \frac{e}{k}$$

k refers to half of the maximum score for the Yes/Practical answer and was divided with an obtained score that chose Yes/Practical answer (Singarimbun & Effendi, 1989). The instrument is declared valid if it meets the requirements, the scale of the reproducibility coefficient if Kr > 0.90, and the scalability coefficient (Ks) Ks value > 0.60 (Usman Rianse: 2008).

The results of the pre-test of students in the experimental class and control class were carried out by the normality test and homogeneity test. The normality test was used to see whether the residual values were normally distributed or not by using the Kolmogorov Smirnov test with a significance level of 0.05. The criteria for the Kolmogorov-Smirnov normality test are declared normal if the value of Sig. 0.05. Then the data was declared normally distributed. The homogeneity test using the Levene Statistic test was used to determine whether the data for each group of variables have the same data variance or not. The level of significance of the Levene Statistic 0.05 with the acceptance criteria of Sig. 0.05, then the data is declared homogeneous.

A post-test was conducted on the experimental class and the control class. The post-test data were analyzed for normality and homogeneity tests. Normality test using Kolmogorov Smirnov and reliability test using Levene Statistic. If the data was declared normal and homogeneous, the post-test result data was carried out with the Normalized Gain (N-Gain). It measured student learning outcomes after receiving treatment (Hake, 1999). The calculation of the N-Gain score can be shown in the following formula:

$$g = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ Maksimal - Skor\ Pretest}\ x\ 100\%$$

The translation of *N-Gain* score can be seen in the table 3:

Table 3. N-Gain Score

Percentage (%)	Meaning
<40	Not Effective
40-55	Less Effective
56-75	Adequate Effective
>76	Effective

Source: Suharsimi (2006)

The pre-test and the post-test score were tested by using *the Independent Sample t-Test (T-test)* to determine the difference significant in the average score from both groups. The level of significance is 5% with acceptance criteria if $t > t_{tabel.}$

RESULT AND DISCUSSION

The practicality of audio-visual media in drawing polygon can be known by the questionnaire of teachers and students. The indicators instrument consisted of easy to use, learning process, materials' appropriateness, materials' attractive, and can be used as learning independent tools. The questionnaire items were constructed by using Guttman's theory (2016). The practical result of audio-visual media can be seen in table 4.

Table 4. The practicality result of audio-visual media

RESP	QUESTIONNAIRE ITEMS																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
2	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	TP	
3	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	
4	TP	P	P	P	P	TP	P	P	P	P	P	P	TP	P	P	P	P	TP	P	P	P	P	P	P	P	
5	P	TP	P	P	P	P	P	P	P	P	TP	P	P	TP	P	P	P	P	P	P	P	P	TP	P	P	
6	P	P	P	P	P	P	P	TP	P	TP	P	P	P	P	P	P	P	P	P	TP	P	TP	P	P	P	
7	P	P	P	TP	TP	P	P	P	P	P	P	P	P	P	P	TP	TP	P	P	P	P	P	P	P	P	
8	TP	P	P	P	P	P	P	P	TP	P	P	P	TP	P	P	P	P	P	P	P	TP	P	P	P	P	
9	TP	P	P	P	P	P	TP	P	P	P	P	TP	TP	P	P	P	P	P	TP	P	P	P	P	TP	P	
10	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	
11	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	
12	P	TP	TP	P	P	P	P	P	P	TP	P	P	P	TP	TP	P	P	P	P	P	P	TP	P	P	P	
13	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	
14	P	P	P	TP	P	P	P	P	P	P	P	TP	P	P	P	TP	P	P	P	P	P	P	P	P	P	
15	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	
16	TP	P	P	P	P	P	TP	P	P	P	P	P	TP	P	P	P	P	P	TP	P	P	P	TP	P	P	
17	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	
18	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	P	P	TP	
19	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	
20	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	
21	P	TP	P	TP	P	P	P	P	P	P	P	P	P	TP	P	TP	P	P	P	P	P	P	P	P	P	
22	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	TP	P	
23	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	
24	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
25	P	P	TP	P	P	P	P	P	TP	P	P	P	P	P	TP	P	P	P	P	P	TP	P	P	P	P	
26	TP	P	P	P	P	TP	P	P	P	P	P	P	TP	P	P	P	P	TP	P	P	P	P	P	P	P	
27	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
28	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	
29	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	
30	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	TP	P	P	
31	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
32	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	
33	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	TP	P	
34	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	
35	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	
36	P	P	P	P	P	P	P	P	P	TP	P	P	P	P	P	P	P	P	P	P	P	TP	P	P	P	
e	5	3	4	5	3	5	4	4	4	5	3	2	5	3	4	5	3	5	4	4	4	5	3	3	2	97
Tn	31	33	32	31	33	31	32	32	32	31	33	34	31	33	32	31	33	31	32	32	32	31	33	33	34	803

Based on the data, reproducibility coefficient Kr = 0,93. It means that polygon learning media developed by the researcher declared very practical to be used since the criteria 0,90. The scalability test Ks = 0,7 showed audio-visual media had fulfilled the required criteria.

In the next phase, the two groups of students did *a pre-test.* After conducting *the pre-test*, the students got treatment by using audio-visual media in drawing the polygon. While in the control class the students gained the materials based on the textbook. At the end of the learning process, both groups joined the *post-test.* The result of *the pre-test* and *post-test* can be seen in table 5.

Table 5. The result of *pre-test* and *post-test*

No. Resp	Experiment Class		Control Class	
	Pre-test	Post-test	Pre-test	Post-test
1	45	82	48	71
2	44	86	58	75
3	40	84	55	70
4	40	84	50	67
5	38	80	40	69
6	50	86	58	71
7	45	84	60	73
8	46	84	55	71
9	45	86	48	65
10	48	85	60	70
11	50	88	50	74
12	45	82	50	68
13	40	82	40	65
14	40	84	54	71
15	52	90	50	67
16	43	82	56	65
17	40	82	45	68
18	53	84	60	67
19	52	90	60	72
20	45	82	55	70
21	40	82	45	72
22	45	86	50	72
23	45	84	52	70
24	50	90	65	74
25	45	80	56	67
26	45	82	48	65
27	50	88	55	70
28	45	82	48	72
29	50	90	55	70
30	46	82	50	73
31	50	82	50	74
32	45	80	45	63
33	52	85	57	73
34	55	90	58	71
35	50	90	55	72
36	42	80	48	72
Maximum Score	55	90	65	75
Minimum Score	38	80	40	63
Average Score	46	84.44	52.47	69.97

The N-Gain score was got by the difference score between pre-test and post-test. The N-Gain score can be seen in table 6.

Table 6. The result of the N-Gain Score

No	Experiment Class	No	Control Class
	N-Gain Score (%)		*N-Gain Score (%)*
Average	71.34	Average	36.17
Minimum	63.64	Minimum	17.50
Maximum	80.00	Maximum	49.09

Based on the N-Gain score, the data showed the average score of N-Gain in the experiment class achieved 71,34 or 71,34%, with a minimum score of 63,64% and a maximum score got 80%. Meanwhile, the average score of N-gain in the control class got 36,17 or 36,17%, with a minimum score of 17,5% and the maximum score achieved 49,09%. Those scores were interpreted in table 3.

Based on the N-Gain score, it can be concluded that the average score of the experiment class was 71,34%. It meant the usage of audio-visual media in drawing polygon was effective to improve students' achievement. While the conventional method showed the N-gain score of the control class was 36,17% or ineffective to give an improvement. This result was in line with Awasthi (2014), who explained that learning through audio-visual media was easy, effective, and permanent since it activated all human senses.

The requirements analysis test was applied to know the data normality and homogeneity. The normality test used the SPPS application by using *Kolmogorov Smirnov* and *Levene Statistic* test for reliability test. The result of the normality test was shown in table 7.

Table 7. The result of the normality test

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
N-Gain Percentage	Experiment Class	.100	36	.200*	.945	36	.074
	Control Class	.107	36	.200*	.957	36	.179

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on *Kolmogorov Smirnov* and *Shapiro Wilk,* Sig score in N-Gain showed 0.200 > 0.05 for experiment class and control class. It can be concluded that the data was normally distributed.

The reliability test used *Levene Statistic* toward N-Gain in both groups. The reliability test can be shown in table 8.

Table 8. The result of reliability test *Levene Statistic*

Test of Homogeneity of Variances			
N-Gain Percentage			
Levene Statistic	df1	df2	Sig.
6.170	1	70	.085

Based on table 8, the data of learning results were declared reliable since Sig. score 0.085 or higher than the signification standard 0.05.

Independent Sample t-Test was conducted to know the different results between experiment and control class based on N-Gain. The hypothesis of the study, Ha was accepted if t *count* > t *table* (95%) or it stated learning media was effective to improve learning output in drawing a polygon. Ha was rejected if t *count* < t *table* (95%). It meant the audio-visual media was ineffective for increasing learning output. *Independent Sample t-Test* used SPSS with the result as follows.

Table 9. The result of the *Independent Sample t-Test*

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
NGain_Persen	Equal variances assumed	6.170	.015	22.432	70	.000	35.16093	1.56748	32.03470	38.28716
	Equal variances not assumed			22.432	58.275	.000	35.16093	1.56748	32.02360	38.29826

Based on table 9, F-*count* achieved 6.170 with Sig. (2-tailed) 0.000 < 0.05. It can be concluded that there was a difference in average scores between the control and experiment classes.

The development of audio-visual media (product) in drawing polygon declared effective in improving students' achievement. The learning process was conducted systematically, and the students became active in participating in the class since the audio-visual media can attract them. The developed media adopted the ADDIE model, ADDIE model refers to *Analysis, Design, Development, Implementation, dan Evaluation* (ADDIE).

Based on the results, it can be concluded audio-visual media in drawing polygon improved learning output effectively, and it is easy to use. This result was in line with Khumaedi et, al (2021), who elaborated audio-visual media and written learning sources had different results in drawing orthography projection. Mujiarto et al (2019) found that the usage of animation and multimedia in engineering drawing can improve students' achievements, especially in orthography projection subjects. Positive impact was gained in using audio-visual media toward students' speaking skills (Gutters & Quintas, 2018).

The usage of audio-visual media got a positive response from teachers and students. This result was in line with Shabiralyani et al (2015) who stated most teachers and students had a positive perception toward audio-visual tools. Rezaie & Barani (2011) showed the teachers had a good perception toward audio-visual media based on their role in the learning process. So it can be stated the equipment proofed effective and improved students achievements.

The research result of the study was similar to Awasthi (2014) who elaborated that learning through audio-visual media was easy, effective, and permanent since it activated all human senses. It is because audio-visual media stimulated visual and audio of humans worked together to accept and organize the information. The higher possibility to catch the information means the higher the human brain remembers the information (Azhar, 2007). Audio-visual media can be played in the video player, so that delivering material can be controlled by pausing, accelerating, slowing down, or repeating (Yuliani et al., 2017)

The video was suitable to support the teacher in delivering geometry construction, especially in drawing polygon. It was because video can bring a variety of contents that can be accepted in many senses (Sainsbury et al., 2017). The other crucial point was video not only influenced learning output, but also video did not give high N-Gain (Arifin, 2009). In N-Gain, the video included into quite effective. This count showed there was weakness in audio-visual media.

CONCLUSION

The conclusion of the research was; first, the developed media has the feasibility from the media and material aspects. Second, the developed audio-visual media in drawing polygon has high practicality. In other words, it was easy to use in the learning process by achieving 0.93. Third, this media had high effectiveness in improving learning output. The students who studied through audio-visual media got an average score of 71,34%, while the students who learned through the handbook gained 36,18% of the average score. This research was not perfect and needed some improvements. The researcher hoped-for future study, other researchers dig up this topic so that the media became advanced and learning out-put can be improved tremendously.

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