No. 481 | REC. 06-09-2021 | REV. 16-09-2021 | ACC. 30-10-2021

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390
tip.ppj.unp.ac.id

Jurnal Teknologi Informasi dan Pendidikan
Volume 14, No. 3 (Special Issue), December 2021
PG. 200 –207 | https://doi.org/10.24036/tip.v14i3

Design And Development Of Animation-Based Learning Media Using Osiloscope

Lelen Aprilia Dian Putri [1] , Putra Jaya[2]
[1]Pendidikan Teknik Elektronika, Universitas Negeri Padang, Indonesia
[2]Pendidikan Teknik Elektronika, Universitas Negeri Padang, Indonesia
*lelenapriliadianputri23041998@gmail.com

INTISARI

Perancangan dan pembuatan media ini bertujuan untuk menghasilkan media pembelajaran penggunaan osiloskop berbasis animasi dengan tingkat validitas dan kepraktisan yang memenuhi syarat. Perancangan dan pembuatan media pembelajaran ini menggunakan model ADDIE (Analysis Design Development Implementation Evaluation). Model ADDIE ada lima tahap, 1) analisis; 2) perancangan; 3) pengembangan; 4) implementasi; 5) evaluasi. Tes validitas dari media pembelajaran yang dirancang berjalan dengan dua tingkat validasi, 1) validitas ahli materi, diuji oleh dua ahli materi; 2) validitas ahli media, diuji oleh dua ahli media. Tes kepraktisan dilakukan oleh dua guru Teknik Audio Video di SMKN 1 Sumatera Barat dan 12 siswa X TAV 1 SMKN 1 Sumatera Barat. Hasil analisis validitas materi dengan skor rata-rata 0,93 yang berkategori sangat tinggi dan hasil analisis validitas media dengan skor rata-rata 0,89 yang berkategori sangat tinggi. Hasil praktikalitas oleh guru dan siswa menunjukkan bahwa skor rata-rata berturut-turut adalah 94,3% dan 80% yang berkategori sangat praktis. Data yang diperoleh menunjukkan bahwa media pembelajaran penggunaan osiloscope berbasis animasi yang dihasilkan sangat valid dan sangat praktis.

Kata kunci: *Media Pembelajaran, Osiloscope, Animasi, Dasar Listrik dan Elektronika*

ABSTRACT

The design and manufacture of this media aims to produce learning media use of an animation-based oscilloscope with a level of validity and practicality that meets the requirements. The design of this learning media uses the ADDIE (Analysis Design Development Implementation Evaluation) model. The ADDIE model has five stages, 1) analysis; 2) design; 3) development; 4) implementation; 5) evaluation. The validity test of the designed learning media consists of two validation stages, 1) the validity of the material experts, tested by two material experts; 2) the validity of media experts, tested by two media experts. The practicality test was carried out by two Audio Video Engineering teachers at SMKN 1 West Sumatra and 12 X TAV 1 students at SMKN 1 West Sumatra. The results of the analysis of the validity of the material with an average score of 0.93 which are categorized as very high and the results of the analysis of media validity with an average score of 0.89 which are categorized as very high. The results of practicality by teachers and students show that the average scores are 94.3% and 80.0%, respectively, which are categorized as very practical. The data obtained shows that the learning media using an animation-based oscilloscope produced is very valid and very practical.

Keywords: *Learning Media, Use of Oscilloscope, Animation, Basic Electrical and Electronics*

INTRODUCTION

Education is an important part that is always inherent in human life [1]. Education generally aims to shape humans into useful individuals both for themselves, their families, the environment, the nation, and the country. One of the efforts in improving the quality of education can be seen from the success of the learning process. In a learning environment, especially in schools, the learning process in the classroom is closely related to the interaction between students/students and educators/mentor. Interaction in the learning process in the classroom cannot be separated from the influence of the media used by an educator/teacher in delivering teaching materials

[2]. The benefits of the presence of media in the learning process in general are to reduce the possibility of students misunderstanding the material presented by the teacher, and to make learning interesting and interactive [3]. Learning media is a tool that is able to assist the teaching and learning process and serves to clarify the meaning of the message or information conveyed, so that it can achieve the planned learning objectives [4]. Advances in science and technology encourage renewal of the use of technology in the learning process, including the use of multimedia in disseminating information that can be used as learning media [5]. By using learning media, an abstract material will be more easily understood by students and the learning media is packaged in such a way that it can arouse the desire of students to learn [6]. The learning media used can be in the form of simulators, teaching aids, computers, interactive CDs, animated videos and others. With learning media that is in accordance with technological advances, it is hoped that it can overcome student boredom during the guidance process. Based on exploration results and interviews with Mr. Ridcel Yandres, S.Pd., M.Pd. T as a basic electricity and electronics teacher on January 1, 2021 by showing that the knowledge and understanding of class X TAV students at SMK Negeri 1 West Sumatra about the oscilloscope as a basic material is still not optimal, so the learning process is less than optimal. The lack of understanding of students on the use of the oscilloscope is caused by the limited availability of media variations in schools. Relis Agustien [7] based on the results of his research explained that the presence of learning media is an indispensable component in the learning process. The position of the media is not just a teaching aid, but rather an integral part of the learning process. Learning media in addition to being able to replace some of the duties of educators as presenters of material, media also has unique potentials that can help students in learning [8]. Therefore, it is necessary to develop learning media to improve learning attractiveness of students to participate in the learning process. The availability of variations of learning media in the learning process can minimize students' misunderstanding in mastering teaching materials about the oscilloscope as the basic material for learning Basic Electrical and Electronics.

To overcome this, the teacher must be able to make the enthusiasm of students in learning more maximal. One of the media that can help teaching and learning activities is animation learning media [9]. The presence of animated media in learning can help students understand abstract material to be more concrete [10]. Animations can be packaged to convey various types of subject matter according to learning indicators [11].

The design and manufacture of animation-based educational facilities is generally needed to support the learning process in the Audio Video Engineering skill program in SMK. The results of the design and manufacture of learning media using an animation-based oscilloscope in accordance with the validity and practicality requirements can be used as a means to achieve the objectives of learning competence in Basic Electrical and Electronics subjects. Some competencies that require an oscilloscope media include understanding and identifying alternating current waveforms, measuring the amplitude, period, and frequency parameters of alternating current waves. The measurement data is needed to calculate the average value and the effective value of the alternating current wave. The design and manufacture of learning media aims to produce learning media using an animation-based oscilloscope with a level of validity and practicality that meets the requirements.

METHOD

Design and manufacture of learning media using an animation-based oscilloscope using the ADDIE model method. This method has 5 stages, including; (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation [12][18].

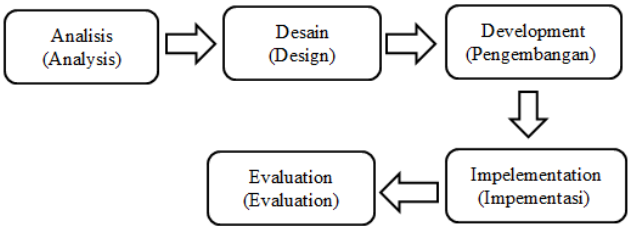

Figure 1. ADDIE Development Model Steps

The analysis stage is an activity of gathering information as a material for making products. At this stage an analysis is carried out to classify and identify the availability of learning media facilities and infrastructure used in schools [19].

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390

Furthermore, a needs analysis is carried out, namely determining the learning media needed by students to improve the quality of teaching and learning and student understanding.

The design stage is the stage of making the product framework. The design of learning media products in the form of storyboards as sketches of an image that is arranged according to the material presented. The development stage aims to create animated learning media with reference to the designs that have been made and testing of animated learning media. The animation learning media that has been created is validated by media experts and material experts. The results of the media assessment are adjusted to the ideas and input of material expert validators and media experts in order to obtain valid media results. The validation process was carried out by 4 validators from lecturers and media experts at the Department of Electronics Engineering, FT UNP and Audio Video Engineering at SMK Negeri 1 West Sumatra.

The implementation stage is carried out through a practicality test after the results of the expert validity test have met the good criteria. The practicality test was carried out on teachers and students of Audio Video Engineering at SMK Negeri 1 West Sumatra as practitioners and users. Limited trials were conducted on small group subjects with a total of 4-14 respondents [13]. Then the evaluation stage is the last stage of the ADDIE model. At this stage it can be seen how the user responds to the assessment of the animated media that has been made.

The technique of analyzing content and construct validity data used the Cohen Kappa formula with the kappa moment equation;

$$\text{kappa moment (k)} = \frac{\rho_0 - \rho_e}{1 - \rho_e} \quad (1)$$

k = Kappa moment indicating product validity

0 = The realized proportion, calculated by dividing the number of values given by the validator divided by the maximum number of values

e = The unrealized proportion, calculated by subtracting the maximum number by the total value given by the validator divided by the maximum number.

Table 1. Decision Category Based on Kappa Moment (k)

Interval	Category
0,81 – 1,00	Very high
0,61 – 0,80	Tall
0,41 – 0,60	Currently
0,21 – 0,40	Low
0,01 – 0,20	Very low
< 0,00	Invalid

(Boslaugh, 2008: 12)

Data analysis techniques to determine the effectiveness of the average score obtained, is done by adding up the values of the number of questionnaire indicators. The formula is calculated using the formula;

$$\text{NA} = \frac{S}{SM} X\ 100\% \quad (2)$$

NA = Final Score
S = Score obtained
SM = Maximum Score

Table 2. Practicality Category

Achievement Rate (%)	Category
81 – 100	Very Practical
61 – 80	Practical
41 – 60	Practical enough
21 – 40	Less Practical
0 – 20	Not Practical

Source: Riduwan (2007:89)

RESULTS AND DISCUSSION

After observation and interviews , conducted the analysis of the performance (Performance Analysis) , At this stage the data obtained about; 1) Schools that only use PowerPoint media in the learning process , 2) Inadequate learning media to support the oscilloscope material in animation-based Basic Electrical and Electronics learning. Based on the results of these observations and interviews, a learning media using an animation - based oscilloscope is proposed for the subjects of Basic Electrical and Electronics Class X TAV . This media is required to facilitate the learning process, to overcome the problems encountered, and assist students in mempelajar i material osiloscope. At this stage of the analysis of needs (needs Analysis), the proposed media penyajian to the material practices based on the syllabus curriculum 2013 to KD 4.12. The use of this media can be used with the support of computers owned by the school and students' personal laptops. This media has a menu about the syllabus, lesson plans, introduction to practicum and evaluation. S ach students can immediately use it without a username and password. The practice material menu shows an animation of alternating current wave measurements using an oscilloscope in turn according to the sequence contained in the learning indicators. Storyboard used as an interface animation-based learning media.

a. Main Page Storyboard The main page is the start that indicates the media is ready for use. The main page is equipped with an opening image containing the writing of learning media based on basic animation of electricity and electronics, logo and play button. The main page design can be seen in Figure 2.

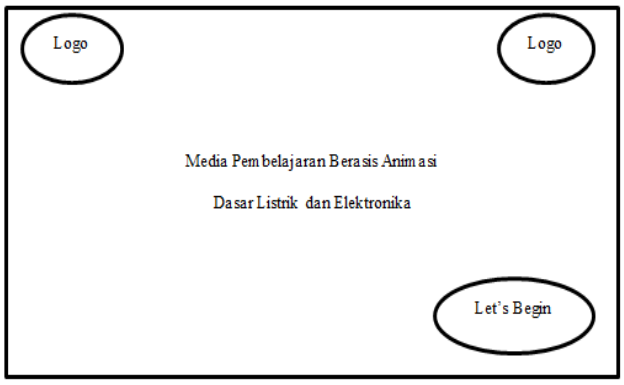

Figure 2. Main Page

b. Home Page Storyboard The home page consists of 5 buttons , including the Syllabus , RPP , Introduction to Practicum, Evaluation, and Exit buttons . In addition to these five buttons, on this page there is also a main button that is used to access the main page. The design of the home page can be seen in Figure 3.

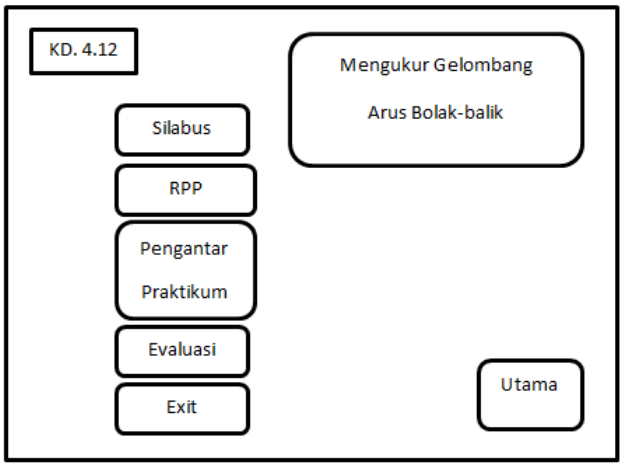

Figure 3. Homepage

c.Animated Page Storyboards The animation page contains several animation options that are presented. The animation page contains six buttons that are displayed, namely the introduction of the oscilloscope , oscilloscope calibration, AC voltage measurement, frequency measurement, and simulation of experimental circuit results. The oscilloscope calibration page displays an animation of the oscilloscope calibration. The AC waveform voltage measurement page displays a picture of the AC waveform voltage measurement and the resulting waveform. The frequency measurement page displays frequency measurements using AFG and the resulting waveform . The oscilloscope introduction page shows a basic introduction to the oscilloscope. In the experimental results page, the resulting waveform with variations in frequency is shown . The circuit simulation page shows a simulation of the filter circuit using the Proteus circuit application. The design of the home page can be seen in Figure 4.

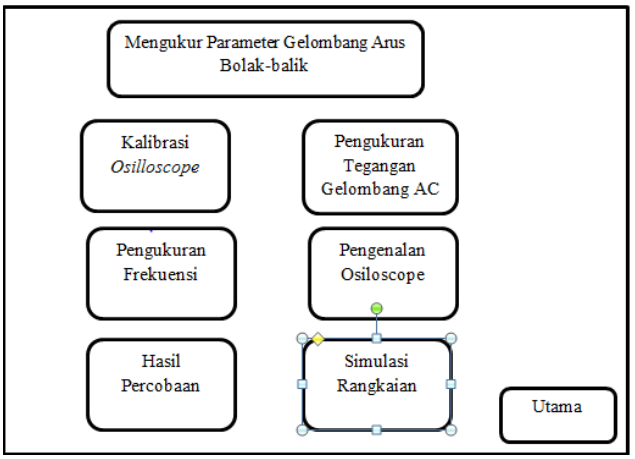

Figure 4. Animated Pages

d.Storyboard Evaluation Page The evaluation page begins with the student identity filling page , followed by the start button to start working on the evaluation. When the user begins the evaluation , appears MCQ d late are automatically moved to the next question when a user already has an answer. The evaluation page design provides a main button if you want to return to the home page. The evaluation page design can be seen in Figure 5.

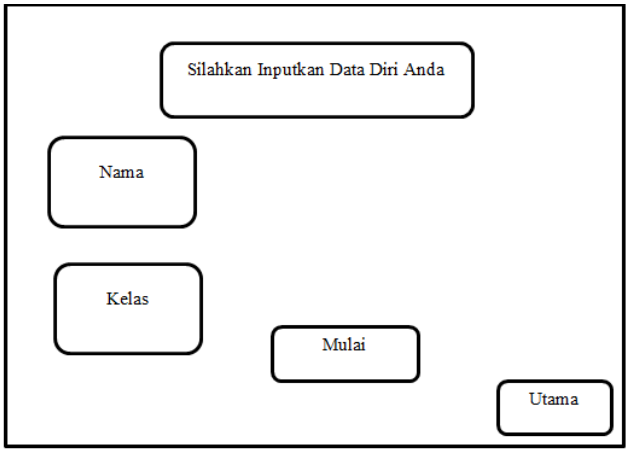

Figure 5. Evaluation page

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390

After the storyboard design has been completed, the media elements are created and arranged based on the storyboard . This stage resulted from the development of a previously designed storyboard . 1) The main page is the starting page which is equipped with an opening image containing the writing of learning media based on basic animation of electricity and electronics, 2 logos and a play button to go to the next scene. The main page display can be seen in Figure 6.

Figure 6. Main Page

2) The home page contains the KD title to be displayed . This page contains 5 buttons and one main button to access the main page. The design of the home page can be seen in Figure 7.

Figure 7. Homepage

3) On page view animation there are 6 buttons on the use osiloscope as described ditahap design (design) page animations. The animation page display can be seen in Figure 8.

Figure 8. Animated Pages

The display results from the oscilloscope calibration animation to alternating current wave measurements can be seen in Figures 9, 10 and 11.

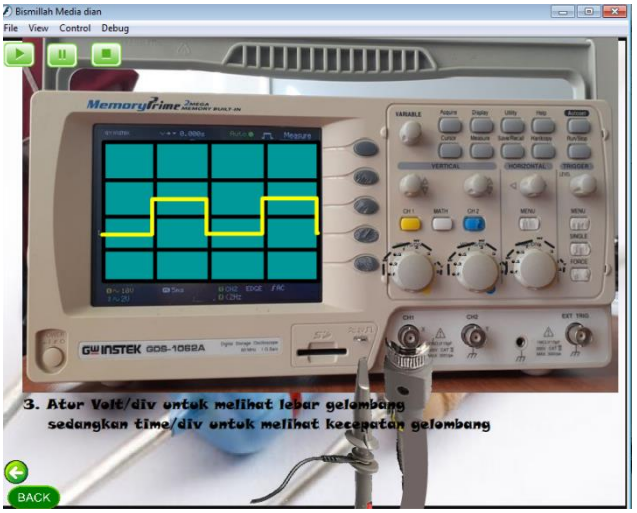

Figure 9. Oscilloscope calibration

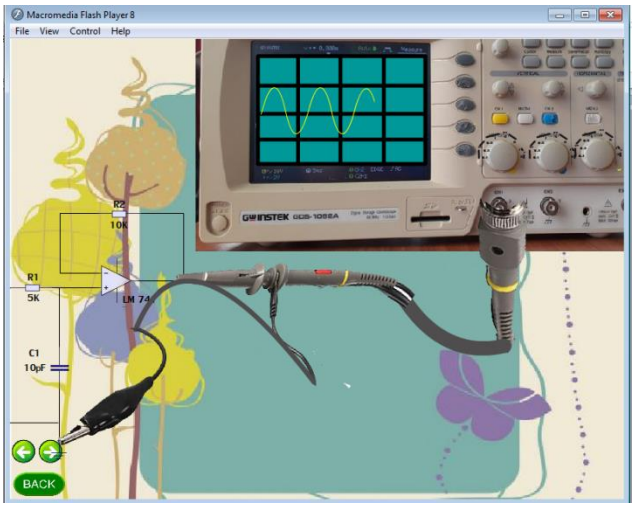

Figure 10. AC Wave Measurement

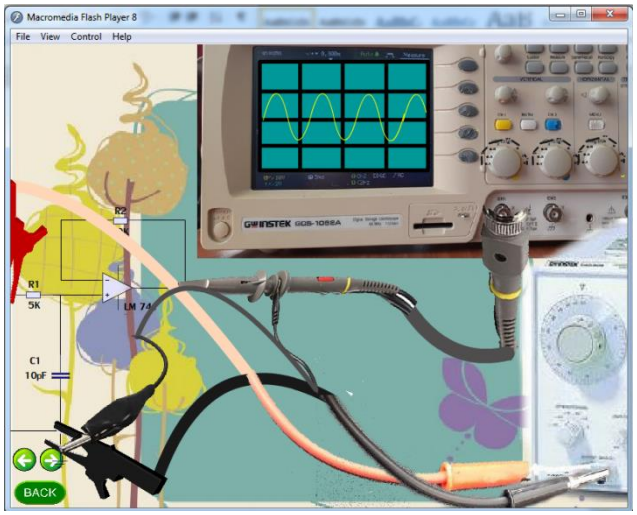

Figure 11. Frequency Measurement

4). The evaluation page contains an identity that must be filled in by students when they start answering questions . M emuat home button if you want to load the home page and begin to start an evaluation. When the user starts the evaluation , the question will appear once and when the user has selected an answer , it will automatically move directly to the next question. After finishing answering all the questions. The score will be directly listed on the page . K emudian provided the keys to start again if the student wishes to repeat the answer evaluation. The display of the page can be seen in Figures 12 and 13.

Figure 12. Evaluation page

Figure 13. Evaluation Results Page

4) The exit page will display a question “Are you sure you want to exit?' then there is a yes button to immediately exit the media and a no button to return to the home page. The exit page display can be seen in Figure 14.

Figure 14. Exit page

After making animation-based learning media at this development stage, validation was carried out by material experts and media experts. Data on the assessment of material experts and media experts carried out by two lecturers of Electronic Engineering FT UNP and two Audio Video Engineering teachers at SMK Negeri 1 West Sumatra to get the validity value of learning media, as shown in table 3 and table 4.

Table 3. Results of Material Expert Data Validity

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390

No	Aspect of Validity	(k)	Category
1.	Relevance	0.94	Very high
2.	Accuracy	0,92	Very high
3.	Serving Equipment	0,95	Very high
4.	Basic Concepts of Material	0,94	Very high
	Average k	0,93	Very high

Note: k = kappa moment

The total of each aspect of the material expert is 0.93. This data is interpreted as a Very High category.

Table 4. Results of Media Expert Data Validity

No	Aspect of Validity	(k)	Category
1.	Coloring	0,91	Very high
2.	On-screen display	0,87	Very high
3.	Presentation	0,88	Very high
4.	Animation and sound effects	0,92	Very high
	Average k	0,89	Very high

Note: k = kappa moment

The total for all aspects of media experts is 0.89. This data is interpreted as a Very High category. After getting the data from the validity of the test results, then the implementation phase to test the practicality of clicking etahui whether media animations based learning practical or impractical. The data from the practicality test are shown in table 5 and table 6.

Table 5. Results of Teacher Practicality on Media

No	Practical Aspect	%	Category
1.	Ease of Use of Media	91	Very Practical
2.	Time Effectiveness	94	Very Practical
3.	Media Use	98	Very Practical
	Average	94,3	Very Practical

The average final score of the three aspects is 94.3% which is included in the Very Practical category . Based on the test results are interpreted that the practicalities of teaching materials based animation-based learning media[17] including entry classified as category Very Practical as a learning medium.

Table 6 . Student Practical Results on Media

No	Practical Aspect	%	Category
1.	Ease of Use of Media	83	Very Practical
2.	Time Effectiveness	74	Practical
3.	Media Use	83	Very Practical
	Average	80	Practical

Based on the data in Table 6, it can be explained that the results of student assessments on the practicality test from the aspect of media ease of use obtained a score of 83 included in the Very Practical category , the time effectiveness aspect obtained a value of 74 included in the Practical category , the media usability aspect obtained a value of 83 included in the Very Practical category. . The average value of the three aspects is 80, which is included in the Practical category . The data from the validity and practicality test results obtained provide an overall interpretation that the results of designing and making learning media using an animation-based oscilloscope are feasible to use.

These results are in line with the results of Elga Mukhni Rahayu's research [14] explaining that animationbased media can be used in learning to assist learning activities . Using animated media during the teaching and learning process can help teachers deliver the material. With the animation media in learning can also help students understand abstract material to be more concrete, so students do not just fantasize. The advantage of using animated media in learning is that an attractive animation design can make learning not boring and can motivate student learning.

The design and manufacture of learning media using an animation-based oscilloscope using Macromedia flash 8 agrees with the results of Jamiatul Fitri's research [15][16] . Macromedia Flash 8 is a professional and flexible program for producing animated media. Macromedia Flash is widely used by web designers because it has superior capabilities in displaying multimedia, a combination of graphics, animation, sound, and user interactivity. Macromedia Flash is a standard professional authoring tool application program used to create stunning, interactive, attractive and dynamic vector and bitmap animations .

CONCLUSION

Based on the results of the validity and practicality analysis that has been obtained, it provides an interpretation that the design and manufacture of this learning media has achieved the goal of producing learning media using an animation-based oscilloscope with a level of validity and practicality that meets the requirements.

SUGGESTION

Based on the research that has been done, the following can be suggested.

1. Need to be developed again with the addition of sound effects / dubbing while the animation is being displayed to make it more interesting.

2. It is recommended for teachers to use animation learning media as an alternative learning media in the learning process.

REFERENCES

[1] Abdul Rahmat. 2010. Pengantar Pendidikan : Teori, Konsep, dan Aplikasi. Bandung: Manajemen Qolbun Salim. Ideas Publishing

[2] Teni Nurrita. 2018. Development of Learning Media to Improve Student Learning Outcomes. Misykat.

[3] Dian Rudiawan. 2015. Pengaruh Multimedia Model Tutorial Terhadap Hasil Belajar Gambar 3 Dimensi Siswa SMK. Bandung. Journal of Mechanical Engineering Education.

[4] Dharma, Surya. 2012. Performance Management Philosophy Theory and Its Application. Yogyakarta: Student Library

[5] Martius Tekege. 2017. Pemanfaatan Teknologi Informasi dan Komunikasi Dalam Pembelajaran SMA YPPGI Nabire. Jurnal Fateksa : Jurnal Teknologi dan Rekayasa.

[6] Pramita Setiyo Rahayu. (2009).Pengembangan Media Pembelajaran Matematika Interaktif Untuk Memfasilitasi Belajar Mandiri Pada Pokok Bahasan Luas Dan Keliling Bangun Datar Di Kelas Bilingual SMP Tingkat VII. Skripsi S1 Pendidikan Matematika FMIPA Universitas Negeri Yogyakarta

[7] Agustien Relis. 201 8 . Development of Learning Media of Two-Dimensional Animated Video for Penalty Sites in Bondowoso Using the ADDIE Model for Class X Social Sciences Subject History. Educational Journal.

[8] Idha Nurul Fauziah Gani. 2017. The Use of Audiovisual Media To Improve Student Learning Outcomes In The Subject Of Plant Breeding With Seeds Of The Agribusiness Department, Nursery And Tissue Culture Class X At SMK Negeri 4 Jeneponto. Journal of Agricultural Technology Education.

[9] Andriana Johar . 2014. Application of Meida Video and Animation on Vacuuming and Filling Refrigerant Materials on Student Learning Outcomes. Journal of Mechanical Engineering Education.

[10] Kadek Sukiyasa. 2013. The Effect of Animation Media on Learning Outcomes and Student Learning Motivation.

[11] Trinova Zulvia. 2019. Media Interaktif Animasi Dalam Pembelajaran Tematik Untuk Meningkatkan Aktivitas Belajar Peserta Didik. Jurusan PGMI Fak. Tarbiyah dan Keguruan UIN Imam Bonjol Padang

[12] Nyoman Sugihartini . 2018. ADDIE as a Model for Development of Educational Instructional Media (MIE) for Curriculum and Teaching Courses. Journal of Technology and Vocational Education.

[13] Arikunto, S. (2013). Research Procedure: A Practical Approach. Jakarta: Rineka Cipta.

[14] Elga Mukhni Rahayu. 2020. Design of Learning Media Using Animation-Based Multimeters in Basic Electrical and Electronics Subjects. Journal of Information Technology and Education.

[15]Jamiatul Fitri 2019. Development of Macromedia Flash 8 Learning Media in PAI Subject Class XI IPS 1 SMA Negeri 1 Gunung Noar, Kuantan Singingi Regency. Journal of JOM FTK UNIKS.

P.ISSN: 2086 – 4981
E.ISSN: 2620 – 6390