



Implementation Of Flipbook-Based E-Module In Basic Competence Of Using Pneumatic Measuring Instrument

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Abstract

The development of appropriate learning media basically aims to create learning conditions that enable students to learn actively and fun so that they can achieve optimal learning outcomes. Therefore, the appropriate learning media is needed.

The purpose of this study is to determine the impact of the use of flipbook-based e-modules on learning outcomes in the basic competencies of using pneumatic measuring instruments between two groups of students. This study uses research and development approach.

The research at the feasibility test stage involved 2 module expert lecturers, 2 material expert lecturers and tenth grade students of the Automotive Light Vehicle Engineering Skills Competence with a total of 70 students as the control class and the experimental class. It is discovered that the application of e-modules using flipbooks is very practical, feasible, and effective to use to improve student learning outcomes, especially the material on the use of pneumatic measuring instrument. Based on these results, it can be concluded that flipbook e-module can be used to improve student learning outcomes in the competency of using pneumatic measuring instrument.

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INTRODUCTION

Indonesia is one of the countries affected by the Covid-19 pandemic. The impact of the physical distancing policy to deal with the spread of the Covid-19 virus forced the implementation of online or distance learning at all levels of education. The online learning system is a learning system that is carried out online using the internet network without any traditional face-to-face classes. The teacher must ensure that learning activities run well, even though students are at home.

In order to make the online learning run well, the proper learning media is required to connect teachers and students. Learning media can play a significant role in overcoming boredom in learning, which is in the form of hard files such as books, worksheets, modules, and handouts (Anomeisa & Ernarningsih, 2020). The forms of soft files are e-modules, e-books, and slides (Simarmata et al, 2017). E-module is one of the media that can be used in learning. Currently, e-modules can be displayed in flipbook form. According to Watin & Kustijono (2017), Flipbook is a type of classic animation which is made from a pile of paper resembling a thick book. On each page, the process of something is described which will later appear to move or animate. SMK Wiworotomo Purwokerto is one of the vocational high schools that has been implementing online learning since the Covid-19 pandemic took place. Once online learning activity begins, almost all students in online classes are still lacking in material comprehension if they do not receive instructions in advance from the teacher to read or study. Students have lack of initiation to equip themselves by reading before the learning activity begins. SMK Wiworotomo Purwokerto applies the 2013 curriculum where students are more dominant than teachers, and must have an active and independent role in learning.

Media or teaching materials for online learning to support teaching and learning activities at SMK Wiworotomo Purwokerto, especially for automotive basic work subjects, are still very limited, both in the form of textbooks, LKS and handouts and the absence of electronic modules. The use of software in learning such as e-modules or other learning resources has not been

developed. So that students' interest in learning during online learning is not optimal.

In order to cope with that problem, it is necessary to make an innovation by developing e-modules. The e-module that will be developed at SMK Wiworotomo Purwokerto is in the form of an e-module using a Flipbook because it adapts to the learning devices of students who use smartphones. The Flipbook application was chosen, because this application has more advantages, namely it is easy to use because it can be operated for beginners who do not know the HTML language programming (Hamid & Alberida, 2021; Sa'diyah, 2021). The choice of media is of course adjusted to the objectives of learning.

METHOD

The present study uses research and development (R&D) methods which aim to produce products in the form of e-modules using flipbooks. (Sugiyono, 2013) stated that research and development methods are research methods used to produce certain products, and test the effectiveness of these products. The research subjects used in this study were tenth grade students of class X TKRO SMK Wiworotomo Purwokerto who took the PDTO subject in semester 2 of the 2022/2023 academic year. There were 35 students of X TKRO-1 as the respondents of control class and 35 students of X TKRO- 2 as the respondents of experimental class. The development model in this study uses the ADDIE development model. According to Cahyono et. Al. (2021), there are 5 stages in this development model.

The first step is analysis. At this stage, two types of analysis were carried out, needs analysis and learning component analysis. Need analysis was used as a basis for whether e-module development is needed in teaching and learning activities. The analysis was carried out through direct observation at the observation stage to find out the situation, conditions, and media in the schools where the trials were conducted. learning component analysis is an analysis carried out through observation includes learning objectives, learning materials, and the learning process. In this

study the competence taken was the use of pneumatic measuring instrument.

The next step is design. It was carried out based on the results of the needs analysis that was carried out in the previous stage. At the planning stage, pneumatic material content was prepared. Some images, videos and animations that supported the learning material in making e-module were created and collected.

The third stage is development stage. After preparing the material and making the e-module using a flipbook, it is necessary to test whether the e-module that has been made is in accordance with what is desired or not. The development steps carried out include: developing e-module learning media, validating module experts, material experts, and validating users (students) as well as revising learning media.

The fourth stage is implementation. At the stage, e-module learning media products using

flipbooks was given to X TKRO students at SMK Wiworotomo Purwokerto where one class is the control class and the other class is the experimental class. This trial design is used to test the effectiveness of e-module learning media using flipbooks. The research design that is used in this study is the Two-Group Pretest-Posttest Design.

The last stage is evaluation. The evaluation procedure used is formative evaluation. This kind of evaluation was carried out at the end of each discussion of a subject/topic. The evaluation includes the stages of e-module development, module expert validation, material expert validation, and revision to find out the practicality, feasibility and effectiveness of e-module learning media using the developed flipbook. The flow chart of the product design steps can be observed in Figure 1.

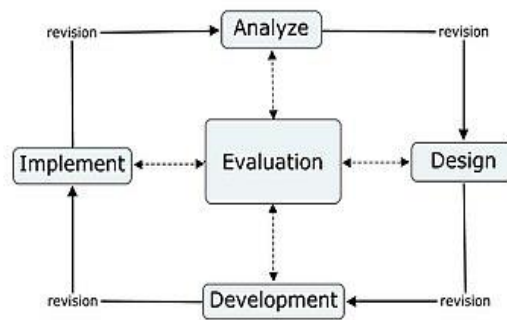


Figure 1. E-module development stage with ADDIE
(Source: Solahudin, 2018)

The analysis technique used is to convert the quantitative research data into percentages to test the feasibility of the e-module learning media. The equation used in the analysis of research data is as follows:

$$P = \frac{\sum x}{\sum x_i} \times 100 \%$$

(Arikunto, 2013)

Information:

- P : Validity Percentage
- $\sum x$: The total number of answers in all items
- $\sum x_i$: Total ideal value in all items

Table 1. Media validity criteria

No.	Achievement Level	Qualification	Information
1	81-100%	Very good	Very feasible
2	61-80%	Good	Feasible
3	41-60%	Fairly good	Less feasible
4	21-40%	Not good	Not feasible
5	<20%	Very not good	Very not feasible

(Arikunto, 2013: 35)

RESULTS AND DISCUSSION

3.1 Expert validation result

Expert validation aims to determine the validity and feasibility of the product produced based on the opinion of experts. The results of the validation activities are used as the basis for

improvements/revisions before the product is tested. The validation activity involved two experts, namely material experts, and module experts.

3.1.1 Material expert validation result

Aspects that were validated including aspects of the appropriateness of the content, language, and presentation presented in the e-module learning media using flipbooks. Complete data on the results of validation activities by material experts is presented in Figure 2.

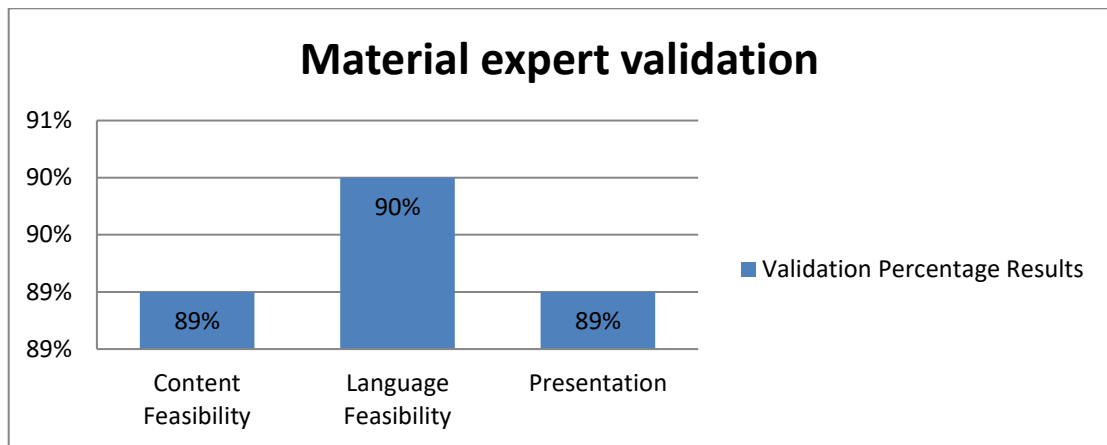


Figure 2. Material expert validation graph

The results of the material validation questionnaire analysis in Figure 2 show that the validation results by material experts obtained a total average of 89.33% with very feasible criteria and overall, the material aspects presented in the e-module learning media using flipbooks are well organized, the scope of material is appropriate and up-to-date for students at the vocational school level and declared fit for use in learning.

3.1.2 Module expert validation result

The validated aspects include aspects of screen design feasibility, user convenience, consistency, graphics, and usability presented in e-module learning media using flipbooks. Complete data from validation activities by module experts is presented on Figure 3.

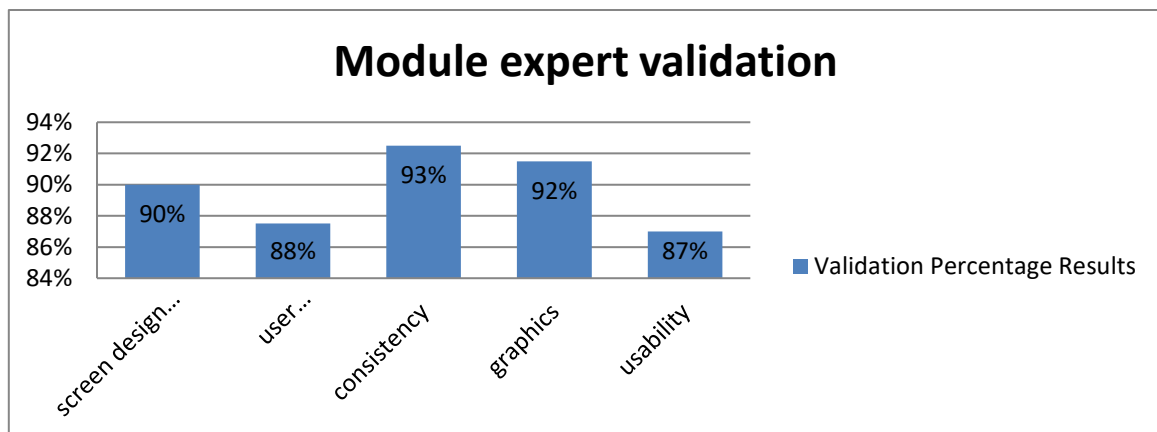


Figure 3. Module expert validation graph

The results of the analysis of the results of the module validation questionnaire in Figure 3 show that the validation results by module experts

obtained a total average of 90% with very feasible criteria and overall, the module aspects were declared feasible and could be tested in learning.

3.2 Product Revision

Although e-module learning media using flipbooks are considered appropriate, there are some suggestions and comments from experts to make improvements or revisions to perfect the material and e-module learning media using flipbooks so that it is more suitable for use in the next response test. According to the advice of experts what needs to be done is as follows:

3.2.1 Material Revision

According to the results of the material feasibility test from material experts, the developed media still has several deficiencies and must be improved, namely:

- a) Material addition
- b) Learning activities must refer to IPK and the contents of learning activities must also refer to learning objectives and learning materials.
- c) Direct the exercise to a learning activity, not only being told to explain it to understand the concept of pneumatics. The word "explain" is just like answering an exam, not describing what activities students must do in order to understand the concept of pneumatics.

- a. Also check the GPA, if you can answer the questions, can you achieve the GPA?

3.2.2 Module Revision

According to the results of the module feasibility test from the module expert, the things that need to be revised in the learning media are:

- a) The cover needs to describe the pneumatic measuring instrument.
- b) Module systematics must follow the manual book.

3.3 Pre-test

To find out whether the experimental group and the control group had the same initial abilities, a pre-test was carried out for the two groups. All calculations in this study use IBM SPSS ver. 26.0 application and acceptance criteria are at a significance (probability) level of 0.05 (5%). The results of the pre-test were then analyzed using the Dependent Samples Test because the samples were paired in the same number between the control class and the experimental class and the results are summarized in Table 2.

Table 2. Pre-test result

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Pair					Lower	Upper			
1	Pretest – Class	58.529	8.471	1.012	56.509	60.548	57.806	69	0,747

Table 2 shows that the learning outcomes between the two groups have a t value of 57.806 and a sig = 0.747 higher than (>) 0.05, so the null hypothesis (Ho) is accepted while the alternative hypothesis (Ha) is rejected. The learning outcomes between the experimental and control groups were the same, thus it can be concluded that both the experimental and control groups had the same initial abilities in the competence of pneumatic measuring instruments before receiving the learning treatment.

3.4 Data Normality and Homogeneity Test

Post-test result data were tested using parametric statistics to fulfill normality and homogeneity. The normality test was carried out using the Kolmogorov Smirnov method while the

homogeneity test was carried out using the Levene's Test. The acceptance criterion for the significance value (sig.) obtained is 0.05. The results of the normality test using the Kolmogorov Smirnov are shown in Table 3.

Table 3. Normality test results using Kolmogorov Smirnov

Group	Kolmogorov-Smirnov		
	Statistic	Df	Sig.
Experimental	0.110	35	0.200
Control	0.135	35	0.110

Table 3 shows that the value of Sig. in the experimental class post-test result was 0.200 > 0.05, so it can be concluded that the data follows a

normal distribution. Whereas in the control class, it shows that the value of Sig. on the results of the post-test produce was $0.110 > 0.05$, it can be concluded that the data follows a normal distribution. Thus, it can be concluded that the post-test data for the experimental class and the control class were normally distributed.

The homogeneity test using the Levene's Test is shown in Table 4.

Table 4. Homogeneity test result with Levene's Test

Levene Statistic	df1	df2	Sig
1.350	1	68	0.249

Based on the table, the significance of homogeneity was $0.249 (\geq 0.05)$ which indicated that the post-test variables in the experimental and control classes are homogeneous so that it can be concluded that the variances of the two data groups are homogeneous.

3.5 Post-test

The post-test was carried out to evaluate learning outcomes after learning with e-module using flipbook in the experimental class group, compared to students who were taught with conventional learning media in the control group. Post-test data were analyzed using the dependent sample T test. Learning outcomes can be seen in the table 5.

Table 5. Post-test result

		Paired Differences					T	df	Sig. (2-tailed)
Pair	Posttest – Class	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1		79.914	13.950	1.667	76.588	83.241	47.929	69	.000

Table 5 shows the calculated t value of 47.929 and sig = 0.00 less than ($<$) 0.05, so the alternative hypothesis (Ha) is accepted while the null hypothesis (Ho) is rejected. So it can be concluded that there are differences in learning outcomes between the experimental and control groups in the competency of using pneumatic measuring instrument after receiving the learning treatment.

Table 6. The average results of the pre-test and post-test

Group	Pre-test Average	Post-test Average	Increase Percentage
Experimental	60.66	91.40	30.74
Control	59.40	71.43	12.03

Table 6 shows that the average pre-test score for the experimental class was 60.66 (sufficient category), but after getting learning with e-module media using flipbooks, the average post-test score increased to 91.40 (very high category). Whereas for the control class, the average pre-test value was

59.40 (sufficient category), the post-test value was 71.43 (sufficient category).

Furthermore, the increase in learning outcomes is accompanied by an increase in the percentage (%) of students whose learning outcomes have met the minimum completeness criteria (score 75) and can be seen in Table 7.

Table 7. The percentage (%) of students who have met the minimum completeness criteria

Group	Number of students	Percentage
Experimental	35	88.57
Control	35	28.57

Based on table 7, the number of students who met the completeness criteria (KKM) in the experimental group with e-modules using flipbooks was 88.57%, while only 28.57% of the control group met the minimum completeness criteria.

3.6 Student assessment results

Research subjects in the present study were asked to assess the e-module using the flipbook

provided after participating in the lesson. The results of student assessment in this study are presented in Figure 4

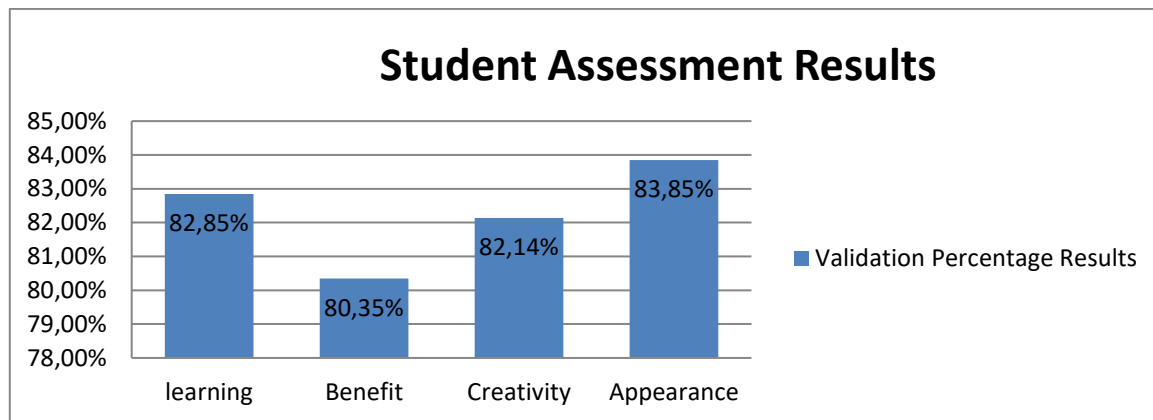


Figure 4. Student assessment results graph

In Figure 4, the percentage of each aspect of e-module media assessment using flipbooks by students is obtained with the results of learning aspect is 82.85% which is included in the very feasible category. The benefits aspect is 80.35% which is included in feasible category. The media creativity aspect is 82.14% which is included in the very feasible category. The appearance aspect is 83.85% which is included in the very feasible category.

The results of the study show that the validation of the questionnaire by the module validator determines the quality and feasibility of e-module learning media using flipbook to be applied in learning. This feasibility is seen from several indicator formulations regarding e-module learning media using flipbooks, such as clarity of goals (indicators) to be achieved, order of presentation, provision of motivation and attraction, interaction (giving stimulus and response) and completeness of information, this is appropriate with the opinion of Cahyono, et al (2021) that the development of good teaching materials must be adapted to the conditions of students and the learning strategies used. Teaching materials contain materials, methods, limitations, and evaluation methods that are designed in a systematic and interesting way to achieve the expected goals. It was further explained by Vebraningtyas et al (2022) that a good module is a module that aims to motivate students to foster interest and independence in learning. In principle, the development of this e-module is based on

reference to the characteristics of the module, including self-instruction which is capable of self-teaching, which means that without teacher assistance, the module can also be studied by students themselves without depending on certain parties. Self-explanatory power, modules are arranged with simple language so that it can present its own content, self-contained which contains the entire learning material. The e-module is designed according to the characteristics and capabilities of the user so that they are able to organize the learning process. It was further stated that modules must also be easy to use, and make students interactive, some of these things have been explained by Aji, M. & Widjanarko, D. (2016) that (1) access, namely ease of use and usefulness of media, (2) cost namely the costs required with consideration of the benefits aspect, (3) technology, namely technology-based media need to pay attention to the existence of technicians and ease of use, (4) interactivity, namely the emergence of two-way communication, (5) organization, namely institutions or organizations that support media production, (6) novelty, namely the novelty of the media can make students more interested.

The results of the study show that the validation of questionnaires by material experts on e-module learning media materials using flipbooks is the three main indicators, namely learning design, materials, and benefits. Some of these things have been explained by Rindaryati, (2021) that a module has other consequences that must be

fulfilled by the module, namely the completeness of the content; meaning that the content or presentation material of a module must be completely discussed through presentations so that in that way the readers feel they understand enough of a particular field of study from the learning outcomes through the module. In e-module learning media using flipbooks, pictures that match the material being taught were used in order to make it easier for students to understand both the material and the exercises. In this case Hardiansyah, (2016) explains that Flipbooks can be presented in an electronic format that can display interactive simulations by combining animation, text, video, images, audio, and navigation which makes students more interactive, so that learning can be more enjoyable and attract the attention of students.

The results of the study confirm that there are differences in student learning outcomes in the competence of pneumatic measuring instruments. It shows that le-module media using flipbooks can be used as a support for the learning process. Therefore, this learning method must be commonly used at all levels of education. It also shows that e-module learning media using flipbooks has a positive impact on students' processing skills. Sugiania, et al (2019) explained that designing learning messages through media that are attractive to students can create effectiveness in learning. This is also in accordance with what was stated by Kusyanti (2021) which stated that e-module learning media using flipbooks had an influence on improving student learning outcomes. In addition, Ummah et al (2020) stated that learning using multimedia has proven to be more effective and efficient and can improve student learning outcomes, while Wahyudi, D. (2019) stated that e-module media provides varied and not monotonous lessons so that students can develop and improve their understanding of learning material independently.

The percentage of students who completed the minimum completeness criteria in the experimental group using e-module media using flipbooks higher than the group using conventional media. It shows that learning with the help of e-modules is more easily accepted and liked by students. This is in line with what was conveyed by Watin & Kustijono (2017) that the

use of e-modules using flipbooks is better when used in a learning context, because the output of the application is easier to operate on PCs and mobile devices that many students already have.

The results of student assessments of the feasibility level of e-module learning media using flipbooks show that the e-module learning media has been packaged very well and easy to use. Khairinal et al. (2021) stated that the use of e-module media using flipbooks can increase students' attention with an attractive appearance, because e-modules using flipbooks can be added with pictures, audio, video, and links (enrich flipbook). When you want to make pages better and more interesting, we can use the "page editor" on Flipbook.

Besides that, according to Oemar Hamalik in Rauda, et al. (2017), the use of learning media in the teaching and learning process can generate new desires and interests, generate motivation, and stimulate learning activities, and even bring psychological influences on students. This was further stated by Asmi, et al (2018), who conducted research to determine the feasibility and responses of students and educators to the development of e-modules using professional flip pdf on temperature and heat material. She adopted the Borg & Gall development model. The e-module validation product with Flipbook learning media met the very good criteria with a percentage of material experts 92.08%, module experts 89.1% and religion experts 90%. While the responses of students and educators obtained very good criteria with a percentage of small group trials of 88.15%, field tests of 88.03%, and educator response tests of 85.96%. Based on these results, the development of e-modules using flip pdf professionals can be used as learning media. Based on this research, it can be said that e-module learning media using flipbooks is one of the good and interesting learning media.

CONCLUSION

After being developed, the application of flipbook-based e-modules is suitable for use in using pneumatic measurement instrument based on module feasibility tests by module experts and material experts. The developed e-module is very practical to use to support students' independent

learning wherever and whenever. Implementation of e-modules using flipbooks is also effective. Based on these results, the use of e-module media using flipbooks is recommended for use when teaching the use of pneumatic measuring instruments such as tire pressure gauges, ac manometers, compression testers, and radiator testers in learning activities to carry out measurements, result reading, and use according to operational standards procedures because of the potency of achieving good result.

REFERENCES

- Aji, M. & Widjanarko, D. (2016). "Pengembangan Media Pembelajaran Memahami dan Memelihara Sistem Starter Tipe Konvensional Berbasis Buku Digital Electric Publication (EPUB)". *Jurnal Pendidikan Teknik Mesin*, 16 (1) : 37-42.
- Anomeisa, A. B., & Emaningsih, D. (2020). Media Pembelajaran Interaktif menggunakan PowerPoint VBA pada Penyajian Data Berkelompok. *Jurnal Pendidikan Matematika Raflesia*, 5(1), 17–31.
- Arikunto, S. (2013). *Prosedur Penelitian, Suatu Pendekatan Praktik*. Jakarta: Rinneka Cipta.
- Asmi, A.R., Surbakti B. A.N.D., & C.H.(2018). "Pengembangan E-Modul Berbasis Flip Book Maker Materi Pendidikan Karakter untuk Pembelajaran Mata Kuliah Pancasila MPK Universitas Sriwijaya". *Jurnal Pendidikan Ilmu Sosial*. 27(1):1-10.
- Cahyono, D.N., Khumaedi, M., Hadromi. (2021). "The Impact of Audio-Visual Media toward Learning Result in the Subject of Seizing Picture" . *Journal of Vocational Career Education*, 6 (1) : 1-10.
- Hamid, A., & Alberida, H., (2021). "Pentingnya Mengembangkan E-Modul Interaktif Berbasis Flipbook di Sekolah Menengah Atas". *Edukatif : Jurnal Ilmu Pendidikan*. 3 (3): 911-918.
- Hardiansyah, D. (2016). "Pengembangan Media Flash Flipbook Dalam Pembelajaran Perakitan Komputer Untuk Meningkatkan Hasil Belajar Siswa Kelas X TKJ SMK Negeri 7 Surabaya". *Jurnal IT Edu*, 01 (02): 5-11.
- Khairinal, Suratno, & Aftiani, R.Y. (2021). "Pengembangan Media Pembelajaran E-Book Berbasis Flipbook Untuk Meningkatkan Kemandirian Belajar Dan Minat Belajar Siswa Pada Mata Pelajaran Ekonomi Siswa Kelas X IIS 1 SMA Negeri 2 Kota Sungai Penuh". *Jurnal Manajemen Pendidikan dan Ilmu Sosial*, 2 (1) : 458- 470.
- Kusyanti. R. N. T. (2021). "Development of Interactive Digital Module Based on Virtual Laboratories in The Covid-19 Pandemic Era in Dynamic Fluid Materials". *International Journal of Active Learning*, 6 (1): 41-48.
- Rauda, R.D., Sutarno, H. & Waslaludin. (2017). "Penggunaan Media Flash Flipbook Dalam Pembelajaran Teknologi Informasi dan Komunikasi Untuk Meningkatkan Hasil Belajar Siswa". *Jurnal Pendidikan*, 1 (1) : 1-6.
- Rinaryati, N.W. (2021). "E-Modul Counter Berbasis Flip Pdf pada Mata Pelajaran Penerapan Rangkaian Elektronika". *Jurnal Imiah Pendidikan Dan Pembelajaran*, 5 (2) : 192-199. .
- Simarmata, E. A., Santyadiputra, G. S., ST, M. C., & Divayana, D. G. H. (2017). Pengembangan E-Modul Berbasis Model Pembelajaran Project Based Learning Pada Mata Pelajaran Pemrograman Desktop Kelas XI Rekayasa Perangkat Lunak di SMK Negeri 2 Tabanan. *KARMAPATI (Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika)*, 6(1), 93–102.
- Solahudin, T. (2018). "Pengembangan E-Modul Berbasis Web Untuk Meningkatkan Pencapaian Kompetensi Pengetahuan Fisika Pada Materi Listrik Statis Dan Dinamis SMA". *Jurnal Wahana Pendidikan Fisika*. 3 (2) : 51-61.
- Sugiania, K. A., Degengb, I. N.S., Setyosaric, P., & Sulton (2019). "The Effects of Electronic Modules in Constructivist Blended Learning Approaches to Improve Learning Independence" . *International Journal of Innovation, Creativity and Change*, 9 (10) : 82-93.

- Sugiyono. (2013). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D) Statistika Untuk Penelitian*. Bandung: Alfabeta.
- Vebrianingtyas, A.F., Sutopo, Y., Kusumawardani, R. (2022). "Application Andorid -Based Interactive Learning Media in Clean Water Pipe Instalation System Teaching Material" *Journal Of Vocational Career Education*" 7 (02), 41-46.
- Wahyudi, D. (2019). "Pengembangan E-Modul Dalam Pembelajaran Matematika SMA Berbasis Android". *GAUSS: Jurnal Pendidikan Matematika*, 02 (02), 1-10.
- Watin, E., & Kustijono, R. (2017). "Efektivitas Penggunaan E-book dengan Flip PDF Professional Untuk Melatihkan Keterampilan Proses Sains". *Makalah. Seminar Nasional Fisika (SNF) FMIPA UNESA*. Surabaya, 25 November 2017.