



# Embom (E-Module Batik Mangrove Organik) For Vocational High Schools

Veronika Yulisna Sinukaban<sup>1\*</sup>, Remon Lapisa<sup>2</sup>, Hasan Maksu<sup>3</sup> Rahmiati<sup>4</sup>



<sup>1,2,3,4</sup> Universitas Negeri Padang, Padang, Indonesia

## ARTICLE INFO

### Article history:

Received June 16, 2024

Accepted October 20, 2024

Available online October 25, 2024

### Kata Kunci:

E-modul, Membuatik, Siswa SMK.

### Keywords:

E-Module, Batik, Vocational School Students.



This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

Copyright © 2024 by Author. Published by Universitas Pendidikan Ganesha.

## ABSTRAK

Sekolah masih mengandalkan buku teks dalam proses pembelajaran membuatik sehingga hasil belajar membuatik belum memenuhi standar kompetensinya. Berdasarkan hal tersebut tujuan penelitian ini yaitu menghasilkan e- modul pembelajaran batik yang valid, praktis dan efektif. Jenis penelitian ini yaitu penelitian pengembangan. Pada penelitian ini menggunakan model pengembangan four-D. Subjek penelitian yaitu 2 ahli materi pembelajaran, 2 ahli media pembelajaran, dan 3 guru. Subjek uji coba yaitu 30 orang siswa kelas XI di SMK. Metode yang digunakan untuk mengumpulkan data yaitu kuesioner dan tes. Instrumen pengumpulan data berupa angket dan soal. Teknik analisis data yang digunakan adalah deskriptif. Hasil penelitian menunjukkan E-modul pembelajaran membuatik yang dihasilkan pada kategori valid, praktis dan efektif baik dari segi kelayakan isi E-modul, kebahasaan E-modul, penyajian E-modul dan kegrafikan E-modul. Hasil penilaian efektivitas media pembelajaran E-modul batik organik mangrove pada penelitian ini menghasilkan nilai N-Gain score yaitu 0,71 sehingga tingkat efektivitas dikategorikan "Tinggi" dengan tafsiran "Efektif". Disimpulkan bahwa E-modul pembelajaran membuatik layak untuk dijadikan sebagai alternatif bahan rujukan dalam pengembangan E-modul Membuatik. Implikasi penelitian ini yaitu E-modul yang dikembangkan dapat digunakan dalam pembelajaran.

## ABSTRACT

Schools still rely on textbooks in the batik learning process, so batik learning outcomes do not meet competency standards. Based on this, this research aims to produce a batik learning e-module that is valid, practical and effective. This type of research is development research. This research uses the four-D development model. The research subjects were 2 learning material experts, 2 learning media experts, and 3 teachers. The test subjects were 30 class XI students at SMK. The methods used to collect data are questionnaires and tests. Data collection instruments are questionnaires and questions. The data analysis technique used is descriptive. The research results show that the batik learning E-module produced is valid, practical, and effective in terms of appropriateness of the E-module content, E-module language, E-module presentation, and E-module graphics. The results of assessing the effectiveness of the mangrove organic batik E-module learning media in this research produced an N-Gain score of 0.71 so that the level of effectiveness was categorized as "High" with the interpretation "Effective". It was concluded that the Batik Learning E-module is suitable as an alternative reference material for developing the Batik E-module. The implication of this research is that the E-module developed can be used in learning.

## 1. INTRODUCTION

Education is a vehicle for improving and developing quality and human resources. Human thinking abilities can be realized and expressed through the education level they will take to gain recognition from society for their existence (Astiwi et al., 2020; Rahaju et al., 2020; Utami et al., 2020). In the Industrial Revolution 4.0, technology plays a vital role in realizing an innovative and modern learning system, which is a form of educational progress (Mukaromah, 2020; Mulyani & Haliza, 2021; Zaini & Soenarto, 2019). Vocational High Schools (SMK) are secondary education institutions in Indonesia that focus on practical learning and technical skills. Vocational Schools offer structured educational programs to prepare students to become skilled workers according to certain areas of expertise (Bustanil S et al., 2019; Hartanti & Yuniarsih, 2018). Through internship programs, learning at SMK focuses not only on

\*Corresponding author.

E-mail addresses: [veronika897@gmail.com](mailto:veronika897@gmail.com) (Veronika Yulisna Sinukaban)

theory but also on direct practice in laboratories, workshops, and even the workplace. It aims to give students real-world experience using the skills they learn in class. Vocational schools also prepare students to continue their education to a higher level or immediately enter the world of work after graduating (Budiman et al., 2020; Wijaya et al., 2020). With a learning approach that focuses on practical skills, SMK can produce graduates who are ready to compete and contribute more directly to industry and society (Budiman et al., 2020; Nasution et al., 2021; Wijaya et al., 2020). Through a combination of theory, practice and general education, Vocational Schools provide opportunities for students to develop their potential according to their interests and talents in specific fields that are in line with current industrial developments (Hidayat & Muladi, 2016; Pratiwi et al., 2022). Berastagi State 1 Vocational High School (SMK) is located in a tourist area in Karo Regency, North Sumatra. The area has a unique culture, and this school has several departments, including the DPKT (Textile et al.) department. The DPKT skills program aims to become experts who can prepare competent workers in the field of batik using elements of traditional batik learning. The expected learning outcome is that students can apply theory skills, cells, and attitudes in batik creation, production, markets and entrepreneurship. Learning batik, especially applying natural dyes from mangrove plants, is one of the essential topics in learning traditional batik. Batik is an integral part of Indonesia's cultural heritage that needs to be preserved, and using natural dyes from mangrove plants is an environmentally friendly choice. However, in the process of learning how to make batik at various educational institutions, especially at SMKN 1 Berastagi, several problems need to be overcome. From the results of observations made on Batik teachers at SMK Negeri 1 Berastagi, information was obtained that the main problem in learning Batik was the interactive limited learning resources that supported an in-depth understanding of batik techniques with natural dyes. Limited access to reading materials, videos, and practical guides hinders understanding natural dyes' basic concepts and applications. Students often feel less interested and involved in learning how to make Batik. Learning less interactive and less attractive media causes a lack of interest in Batik, significantly influencing students' understanding of Batik techniques with natural dyes. Apart from that, the lack of practicum in batik-making hinders achieving batik learning. Students need direct practice in the batik-making process in order to understand batik techniques well. Limited practicum means students need to remember the lesson material the teacher presents. Students still have difficulty mixing dyes from various types of mangrove plants, affecting their understanding and learning outcomes.

Based on these problems, the proposed solution is to use innovative learning media. The media suitable for use during Batik learning is e-modules, modules whose physical form is different from printed modules. The printed module components are processed and converted into electronic form (Buchori & Rahmawati, 2017; Sugiharti et al., 2019; Wahyuni et al., 2020). The use of e-modules makes students interested in the learning process because they can be accessed at any time and under any conditions, are supported by adequate tools, and do not make things difficult for students (Jamaluddin & Nisa', 2019; Lestari & Parmiti, 2020; Nikita et al., 2018). This also makes it easier for teachers to carry out teaching activities even though they are in a different place from the students (Lestari & Parmiti, 2020; Priatna et al., 2017). E-modules as a learning tool contain materials and methods and also provide learning evaluations that are designed to be practical so that they attract students' interest in learning (Buchori & Rahmawati, 2017; Sugiharti et al., 2019; Wahyuni et al., 2020). The e-Module will be equipped with links, animations, and moving images to create a new, dull learning experience. Apart from that, the E-module displays images in clear colour and inserts learning videos and formative tests equipped with automatic feedback delivery so that students can find out the evaluation results they have completed. Previous research findings also reveal that E-modules can make it easier for students to study anywhere (Dewi & Lestari, 2020; Kimianti & Prasetyo, 2019). Other research also reveals that E-modules are used as learning media that play an active role for students and can help teachers deliver material (Rosmawanti et al., 2020; Syafa et al., 2022; Winatha, Naswan, et al., 2018). This confirms that using E-modules is the best way to create an overcome learning environment because it can increase students' interest in the art of batik with natural dyes. Apart from that, the advantage of the Organic Mangrove Batik E-Module that was developed is that it provides a more structured practicum opportunity and helps students mix dyes effectively by following the steps that need to be taken to achieve more effective and exciting learning to make natural dyes from mangrove plants. However, there has yet to be a study regarding the development of the Organic Mangrove Batik E-Module. Based on this, this research aims to develop an Organic Mangrove Batik E-Module that can help students learn.

## 2. METHOD

This type of research is development research. This research uses research and development techniques, abbreviated as R&D (Baya'a et al., 2019). This research will use the four-D development model

applied when creating electronic-based learning media on Batik subjects because it is considered the most relevant to the research objectives. The 4D model divides the process into four main phases: Define, Design, Development, and Disseminate (Sugiyono, 2017). The first stage, the defining step, focuses on identifying and clarifying learning circumstances. The defined step starts with the initial and final analysis of student characteristics, analysis of material concepts, and formulation of learning objectives. At the design stage, preparation of test standards (creating test standards), selecting media (choosing media), selecting formats (choosing formats), and making initial designs are carried out. The development stage aims to produce valid, practical and effective products. The two stages of development are validation of learning media (expert appraisal) and development testing (developmental testing). At the dissemination stage, electronic-based learning media obtains valid, practical, and adequate status based on validity, practicality, and effectiveness tests. Next, in the final stage, dissemination is carried out to promote the development product to users.

The research subjects were 2 learning material experts, 2 learning media experts, and 3 teachers. The test subjects were 30 class XI students at SMK Negeri 1 Berastagi, majoring in Textile Craft Design and Production (DPKT). The methods used to collect data are questionnaires and tests. Questionnaires are used to collect data through assessments given by experts and students. The test method collects data on student learning outcomes after using the Organic Mangrove Batik E-Module. Data collection instruments are questionnaires and questions. The questionnaire uses a Likert scale with five options: Very Good, Good, Not Good, Not Good, and Very Bad. The first questionnaire is helpful in evaluating material validity in products developed by material experts. The second questionnaire was given to media experts to validate the product media being developed. The third questionnaire was addressed to field teachers who taught using e-module learning media and was intended to measure practicality. Apart from questionnaires, this research also uses data collection instruments in the form of questions aimed at students. The questions are intended to measure the effectiveness of the learning media products being developed. The instrument grid is presented in Table 1 and Table 2.

**Table 1.** Grid for expert questionnaires

No	Expert	Aspect
1	Learning Materials Expert	<ol style="list-style-type: none"> <li>1. Guide and Information</li> <li>2. Content/Materials</li> <li>3. Time and Evaluation</li> </ol>
2	Learning Media Expert	<ol style="list-style-type: none"> <li>1. Guide and Information</li> <li>2. Program Performance</li> <li>3. Systematics, aesthetics and design principles</li> </ol>

**Table 2.** Practicality questionnaire grid

No	Aspect	Indicator
1	Media design and facilities	<ol style="list-style-type: none"> <li>1. Learning media is easy to use</li> <li>2. Learning media can be run without damage</li> <li>3. Media provides interactive facilities for users</li> <li>4. Letters, numbers and symbols on the media are written clearly</li> <li>5. Visual images (graphics) in the media are very good</li> <li>6. Audio quality is very good</li> <li>7. Video quality is very good</li> </ol>
2	Pedagogical Effects	<ol style="list-style-type: none"> <li>1. This media provides what students need</li> <li>2. Students are interested in using this media to learn</li> <li>3. This media makes students more enthusiastic/active in learning</li> <li>4. This media helps to understand learning material</li> <li>5. This media helps improve students' abilities</li> </ol>

In this study, the validity of the test items was evaluated using the Pearson correlation formula with a significance level of 0.05. The 40 questions were tested in class. The results of these trials were analyzed using the IBM SPSS Version-24 application. The results of the validation analysis of the questions showed that 33 of the 40 questions were declared "valid" and 7 of the 40 questions were declared "Invalid". Question items are declared reliable if they are good enough to be used as a data collection tool and can be trusted. The questions that were tested for reliability were only valid questions, namely 33

questions. The Cronbach's Alpha value from the test item reliability test using the IBM SPSS version 24 application was 0.898. The instrument is declared reliable if the Cronbach's Alpha value is  $> 0.60$ . With the results of the Cronbach's Alpha assessment = 0.898, which means it is greater than 0.60, the instrument is declared "reliable". The test of the difficulty level of the questions was carried out on 33 questions, which were declared valid and reliable. Of the total 33 questions tested, there was 1 question in the "easy" category and 32 in the "medium" category. The assessment of the differentiability of items in this instrument test also uses the IBM SPSS Version-24 application. Of the 33 questions tested for differentiating power, there were 15 questions with the classification "Fair", and there were 18 questions with the classification "Good". The data analysis technique used is descriptive, this is done to analyze research data. The validity, practicality and effectiveness of e-module learning media were assessed in the analysis carried out. The validity test is obtained from the results of the answers to the validity test sheet carried out. The formula used to determine the statistical magnitude of Aiken's V. Data from the practicality test results were obtained based on questionnaire data obtained from students and teachers who used the organic mangrove batik e-module learning media which was then analyzed using descriptive data analysis. Data effectiveness analysis is carried out to measure the extent to which the product to be developed is successful. Data collection was carried out through tests, because this research aims to measure the learning outcomes of the objects being tested.

### 3. RESULT AND DISCUSSION

#### Result

This research aims to develop an Organic Mangrove Batik E-Module that can help students in learning using a 4-D model. The research results are as follows. First, the Define Stage. The Define stage was carried out to obtain an overview of conditions in the field related to the learning process for class XI Mangrove Organic Batik, Design and Production of Textile Crafts. This stage is carried out by analyzing needs (needs analysis) to create learning support media. Based on the results of the observations, the researchers obtained information about the problems that existed during the Batik learning. Referring to the results of observations made on Batik subject teachers at SMK Negeri 1 Berastagi, information was obtained that the problem was the interactive limited learning resources that supported a deep understanding of batik techniques with natural dyes. Based on the obstacles or difficulties in learning Mangrove Organic Batik, Batik subject teachers hope there will be learning media to support the learning process so that learning material can be delivered effectively and understood by students, student motivation can be increased, and learning objectives can be achieved.

Second is the design stage. At this stage, tests are prepared and used to determine student abilities and as an evaluation tool after implementing activities. This test's preparation is based on the Competency Standards (SK) for the Batik subject. This test is an evaluation tool for student abilities after implementing the e-module learning media. The tests in question are pretest and posttest. The test prepared is an objective test in the form of multiple choice with 40 question items and 33 with validated status. Media selection is done to identify appropriate learning media to present the material. In this research, e-module learning media was chosen and designed using the fliphtml5 program application. The fliphtml5 application was chosen because this software supports the creation of animation, sound, video and photo galleries. E-modules using this application will make it easier for users to access from various devices, including desktops, laptops, tablets and cellphones. Therefore, fliphtml5 was chosen to develop learning media. Furthermore, the choice of format in developing learning media is intended to design and plan the learning content and presentation of learning material. The format chosen is material research in the form of media, which is presented starting from the essential competencies that must be achieved, material descriptions, training and evaluation.

Third, development. At this stage, the development of the Organic Mangrove Batik E-Module was carried out. The materials that attract attention in this media combine text, images, animation and video to make learning more exciting and interactive. Display the initial menu or Home on the E-MBOM (Mangrove Organic Batik Electronic Module) website. One of the pages displays organic mangrove batik material, including the types of mangroves and the various colours they produce. Further material will be on the following pages. The display of video material in the Mangrove Organic Batik e-module for material on the process of making mangrove organic batik is a feature that presents video content as a learning medium. The possible elements in this view are supporting material, multimedia content regarding the batik-making process and ready-made examples. By displaying this video material, students are expected to understand the detailed steps in making organic mangrove batik visually and interactively, thus enriching their learning experience. The display of evaluation questions on the mangrove organic batik e-module is a feature provided in the e-module to measure students' understanding and knowledge after

studying material about organic batik, which uses natural dyes from mangrove plants. This feature usually includes three essay comprehension tests. The development results are presented in [Figure 1](#).



**Figure 1. Batik E-module Display**

The Batik e-module that was developed was then tested for validity. This development stage consists of a validation stage by media and material expert validators, a practicality stage by teachers and students, and a testing stage for the effectiveness of e-module learning media. The data that will be used to measure the validity of the organic mangrove batik e-module learning media will be obtained through input from validators using a questionnaire. Based on Aiken's V formula, the assessment results from learning media experts are an average = 0.81. Suppose it is related to Aiken's V assessment, ranging between values  $\leq 0.60 \geq 1.00$ . This value from the validation results of media experts is declared "valid". The assessment results from learning material experts based on Aiken's V formula are an average = 0.82. Suppose it is related to Aiken's V assessment, ranging between values  $\leq 0.60 \geq 1.00$ . This value from the validation results of material experts is declared "valid". The results of the practicality test from the teacher are that the learning media developed can provide practicality and ease in delivering learning. This practicality data was obtained from a questionnaire filled out by three teachers at SMK Negeri 1 Berastagi in the Batik subject, getting an average score of 93.3%, thus getting an efficient qualification. Results The results of the analysis of the practicality of the mangrove organic batik e-module learning media in this research were 7 out of 30 students said "Practical" and 23 out of 30 students said "Very Practical". The results of the data analysis are presented in [Table 3](#).

**Table 3. Validity and Practicality Test Results**

No	Validator	Average value	Category
1	Learning Media Expert	0.81	Valid
2	Learning Materials Expert	0.82	Valid
3	Teacher Response	93.3%	Very practical
4	Student Response	7 students	Practical
		23 students	Very Practical

Testing the effectiveness of learning outcomes was conducted by looking at student learning outcomes by conducting tests on students as respondents used in this research. The test is carried out twice. Namely, the test was carried out at the beginning when students had not used learning media; the results of this test were called the pretest. Meanwhile, the second test was carried out by treating students, namely, learning by using learning media. The learning results can be obtained after conducting a pretest and posttest using 33 multiple-choice questions. Testing the effectiveness of the mangrove organic batik e-module learning media in this study used the N-Gain Score with 30 respondents. The results of assessing the effectiveness of the mangrove organic batik e-module learning media in this study produced an N-Gain score = 0.71, so the conclusion was drawn that the level of effectiveness was categorized as "High" with the interpretation "Effective".

**Discussion**

The results of the data analysis show that the Organic Mangrove Batik E-Module has excellent qualifications and is very practical, so it is suitable for use in learning. Several factors cause this. The Organic Mangrove Batik E-Module is suitable for use in learning because it can improve student learning outcomes. E-Modules are an effective medium for acquiring material because students can learn at the student's pace (Buchori & Rahmawati, 2017; Nikita et al., 2018; Sugiharti et al., 2019). Printed module components are processed and converted into electronic form. The use of e-modules makes students interested in the learning process because they can be accessed at any time and under any conditions, are

supported by adequate tools, and do not make things difficult for students (Buchori & Rahmawati, 2017; Lestari & Parmiti, 2020; Priatna et al., 2017). This also makes it easier for teachers to carry out teaching activities even though they are in a different place from the students. E-modules are used as learning tools that contain materials, methods and learning evaluations that are designed to be practical so that they attract students' interest in (Kimianti & Prasetyo, 2019; Rosmawanti et al., 2020; Winatha, Naswan, et al., 2018). This material about learning batik was prepared using formulations by several batik experts to form a relationship between relevant material concepts. The preparation of material in the e-module was also carried out by analyzing several reference books used by teachers in learning and also from observations of researchers at batik centres. The material discusses the components that must be present in batik learning material. These components were obtained from researchers' observations and discussions with various batik experts. This is what makes it easier for students to understand the learning material, which has an impact on improving learning outcomes. Second, the Organic Mangrove Batik E-Module is suitable for use in learning because it can make it easier for students to learn. Modules are an effective medium for acquiring material because students can learn according to their abilities (Darwis et al., 2020; Febriana & Sakti, 2021; Gufran & Mataya, 2020). The module presents material systematically, can be used as a learning resource, summarize learning experiences, and help students achieve competency (Buchori & Rahmawati, 2017; Lestari & Parmiti, 2020; Priatna et al., 2017). Therefore, the efficient and effective use of learning media can improve knowledge, skills and attitudes in learning. In developing e-modules, learning models can also be combined by paying attention to suitability to facilitate learning. Electronic modules can be documents or articles that are not in printed form, so it is not a hassle for students when travelling because e-modules can be accessed via electronic devices wherever and whenever the user needs them (Mutmainnah et al., 2021; Solihudin JH, 2018). The electronic module also comes in compact disc (CD) form, allowing users to run directly from the CD or install it first, online or offline, by downloading it first. The strategy for sending electronic modules is straightforward, so it is more effective in utilizing time.

Third, the Organic Mangrove Batik E-Module is suitable for learning because it can improve the learning atmosphere. The e-Module has links, animations, and moving images to create a new and not dull learning experience (Gufran & Mataya, 2020; Solihudin JH, 2018). E-modules also display images in transparent colours, learning videos can also be inserted, and formative tests equipped with automatic feedback delivery can also be included so that students can find out the results of their completed evaluations. E-Modules are self-instructional, meaning they only cover one learning material, so students focus on the material being taught (Raharjo et al., 2017; Sa'diyah, 2021; Solikin, 2018). Independent, namely, all material components listed in the module. Stand-alone means the module can be used alone, so it does not depend on other media. Adaptive because e-module development is by student character. User Friendly means that it suits the user. Consistency is a characteristic of using fonts and other components that are the same and not different from modules in general (Putri et al., 2020; Satria Dewi Pendit et al., 2022). This makes the Organic Mangrove Batik E-Module suitable for learning because it can improve the learning atmosphere. Previous research findings also state that e-modules can improve students' cognitive understanding in the learning process; apart from that, e-modules also provide flexibility in time and place in learning (Maharani Zan & Mardian, 2022; Winatha, Suharsono, et al., 2018). Other findings also reveal that E-modules can increase students' enthusiasm for learning (Feriyaniti et al., 2019; Idiajir & Daryati, 2021). It was concluded that the Organic Mangrove Batik E-Module is suitable for learning because it can facilitate and improve student learning outcomes. The advantage of the Organic Mangrove Batik E-Module is that the design of the e-module is based on the principle of practicality, making it possible to use it in various locations without requiring a particular place and time. The principles of developing learning media include 1) creating an exciting learning experience by challenging the imagination and arousing curiosity, 2) integrating interactive elements, and 3) providing practice opportunities that can motivate students by providing appropriate feedback. The limitation of this research is that the E-module developed only contains material regarding the Organic Mangrove Batik E-Module. The implication of this research is that the developed Organic Mangrove Batik E-Module can help students learn batik.

#### 4. CONCLUSION

The results of the material expert's validation obtained valid criteria, the results of the validation of the language expert with valid criteria and the results of the media expert's validation with valid criteria. The results of the trial of batik e-module user responses show the level of practicality based on practicality criteria. The responses of teachers and students show that the e-module is practical and helps students learn how to make batik. The e-module can be used independently by students with the help of a

computer. It was concluded that the Organic Mangrove Batik E-Module was feasible and effective in improving student learning outcomes. To support the exploration of more complex material components, users (students) can integrate e-modules with internet links. The batik e-module is equipped with text, animation, images and videos as supporting materials for the batik process.

## 5. REFERENCES

- Astiwi, Antara, P. A., & Agustiana, I. G. A. T. (2020). Pengembangan Instrumen Penilaian Kemampuan Berpikir Kritis Siswa SD pada Mata Pelajaran PPKn. *Jurnal Ilmiah Pendidikan Profesi Guru*, 3(3), 459. <https://doi.org/10.23887/jippg.v3i3.29457>.
- Baya'a, N., Daher, W., & Anabousy, A. (2019). The development of in-service mathematics teachers' integration of ICT in a community of practice: Teaching-in-context theory. *International Journal of Emerging Technologies in Learning*, 14(1), 125–139. <https://doi.org/10.3991/ijet.v14i01.9134>.
- Buchori, A., & Rahmawati, N. D. (2017). Pengembangan E-Modul Geometri Dengan Pendekatan Matematika Realistik Di Sekolah Dasar. *Sekolah Dasar: Kajian Teori Dan Praktik Pendidikan*, 26(1), 23–29. <https://doi.org/10.17977/um009v26i12017p023>.
- Budiman, C., Gunawan, G., & Hidayat, D. R. (2020). Layanan Bimbingan Karir Teori Donal E. Super Guna Meningkatkan Kematangan Karir Pada Peserta Didik Di Sekolah Menengah Kejuruan(SMK). *Jurnal Ilmiah Bimbingan Konseling Undiksha*, 11(1), 32–39. <https://doi.org/10.23887/jjbk.v11i1.27383>.
- Bustanil S, M., Asrowi, & Adiando, D. T. (2019). Pengembangan Media Pembelajaran Interaktif Berbasis Video Tutorial Di Sekolah Menengah Kejuruan. *JTP - Jurnal Teknologi Pendidikan*, 21(2). <https://doi.org/10.21009/jtp.v21i2.11568>.
- Darwis, D., Fitriani, E., & Styariyani, D. (2020). Pengembangan Modul Elektronik Berbasis Model Learning Cycle 5E Pada Pembelajaran Kimia Materi Asam-Basa. *JRPK: Jurnal Riset Pendidikan Kimia*, 10(1). <https://doi.org/10.21009/JRPK.101.02>.
- Dewi, M. S. A., & Lestari, N. A. P. (2020). E-Modul Interaktif Berbasis Proyek terhadap Hasil Belajar Siswa. *Jurnal Ilmiah Pendidikan dan Pembelajaran*, 4(3), 433–441. <https://doi.org/10.23887/jipp.v4i3.28035>.
- Febriana, F. D., & Sakti, N. (2021). Pengembangan E-Modul Berbasis Kontekstual Sebagai Pendukung Pembelajaran Jarak Jauh Kelas X IPS. *Jurnal Profit: Kajian Pendidikan Ekonomi dan Ilmu Ekonomi*, 8(1). <https://doi.org/10.36706/jp.v8i1.14057>.
- Feriyanti, N., Hidayat, S., & Asmawati, L. (2019). Pengembangan E-modul Matematika untuk Siswa SD. *JTPPM (Jurnal Teknologi Pendidikan dan Pembelajaran): Edutech and Intructional Research Journal*, 6(1).
- Gufran, G., & Mataya, I. (2020). Pemanfaatan E-Modul Berbasis Smartphone Sebagai Media Literasi Masyarakat. *JISIP (Jurnal Ilmu Sosial dan Pendidikan)*, 4(2). <https://doi.org/10.58258/jisip.v4i2.1060>.
- Hartanti, A. S., & Yuniarsih, T. (2018). Pengaruh Kompetensi Profesional Guru Dan Motivasi Kerja Terhadap Kinerja Guru Di Sekolah Menengah Kejuruan. *Jurnal Pendidikan Manajemen Perkantoran*, 3(1). <https://doi.org/10.17509/jpm.v3i1.9452>.
- Hidayat, W. N., & Muladi, M. (2016). Studi Integrasi Tik Dalam Pembelajaran Di Sekolah Menengah Kejuruan. *Jurnal Pendidikan - Teori, Penelitian, dan Pengembangan*, 1(12), 2281–2291. <https://doi.org/10.17977/jp.v1i12.8228>.
- Idiajir, K., & Daryati, R. S. (2021). Pengembangan Pembelajaran Berbasis E-Modul pada Mata Kuliah Praktik Mekanika Tanah Development Of E-Module Media-Based Learning In Soil Mechanics Practice Course. *Jurnal Pensil: Pendidikan Teknik Sipil*, 10, 89–95. <https://doi.org/10.31004/cendekia.v5i3.467>.
- Jamaluddin, M., & Nisa', R. (2019). Implementasi E-Modul Berbasis Proyek untuk Meningkatkan Aktivitas dan Hasil Belajar Mahasiswa STKIP Qomaruddin Gresik. *Jurnal Pendidikan Matematika*, 4. <https://doi.org/10.33654/math.v4i0.288>.
- Kimianti, & Prasetyo. (2019). Pengembangan E-Modul Ipa Berbasis Problem Based Learning Untuk Meningkatkan Literasi Sains Siswa. *Kwangsan Jurnal Teknologi Pendidikan*, 7(2), 91–103. <https://doi.org/10.31800/jtp.kw.v7n2.p91--103>.
- Lestari, H. D., & Parmiti, D. (2020). Pengembangan E-Modul IPA Bermuatan Tes Online Untuk Meningkatkan Hasil Belajar. *Journal of Education Technology*, 4(1). <https://doi.org/10.23887/jet.v4i1.24095>.
- Maharani Zan, A., & Mardian, V. (2022). The Impact of Static Fluid E-Module by Integrating STEM on Learning Outcomes of Students. *Journal of Education Technology*, 6(1). <https://doi.org/10.23887/jet.v6i1.42458>.

- Mukaromah, E. (2020). Pemanfaatan Teknologi Informasi dan Komunikasi dalam Meningkatkan Gairah Belajar Siswa. *Indonesian Journal of Education Management & Administration Review*, 4(1), 175–182. <https://doi.org/10.4321/IJEMAR.V4i1.4381>.
- Mulyani, F., & Haliza, N. (2021). Analisis Perkembangan Ilmu Pengetahuan dan Teknologi (IPTEK) Dalam Pendidikan. *Jurnal Pendidikan dan Konseling (JPDK)*, 3(1), 101–109. <https://doi.org/10.31004/jpdk.v3i1.1432>.
- Mutmainnah, Aunurrahman, & Warneri. (2021). Efektivitas Penggunaan E-Modul Terhadap Hasil Belajar Kognitif Pada Materi Sistem Pencernaan Manusia di Madrasah Tsanawiyah. *Jurnal basicedu*, 5(2), 1625–1631. <https://doi.org/10.31004/basicedu.v5i3.952>.
- Nasution, A., Siddik, M., & Manurung, N. (2021). Efektivitas Mobile Learning Dalam Pembelajaran Bahasa Inggris Pada Sekolah Menengah Kejuruan. *Journal of Science and Social Research*, 4(1). <https://doi.org/10.54314/jssr.v4i1.470>.
- Nikita, P. M., Lesmono, A., & Harijanto, A. (2018). Pengembangan E-Modul Materi Fluida Dinamis Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa SMA Kelas XI. *Jurnal Pembelajaran Fisika*, 7(2). <https://doi.org/10.19184/jpf.v7i2.7925>.
- Pratiwi, M., Hasanuddin, & Arafat, M. Y. (2022). Evaluasi Model Goal Oriented: Pelaksanaan Praktik Kerja Industri Jurusan Teknik Otomotif di Sekolah Menengah Kejuruan. *Jurnal Ilmiah Pendidikan Profesi Guru*, 5(1). <https://doi.org/10.23887/jipppg.v5i1.47895>.
- Priatna, I. K., Putrama, I. M., & Divayana, D. G. H. (2017). Pengembangan E-Modul Berbasis Model Pembelajaran Project Based Learning Pada Mata Pelajaran Videografi untuk Siswa Kelas X Desain Komunikasi Visual di SMK Negeri 1 Sukasada. *Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI)*, 6(1), 70. <https://doi.org/10.23887/janapati.v6i1.9931>.
- Putri, I. T., Aminoto, T., & Pujaningsih, F. B. (2020). Pengembangan e-modul fisika berbasis pendekatan saintifik pada materi teori kinetik gas. *Edufisika: Jurnal Pendidikan Fisika*, 5(1), 1–11. <https://doi.org/10.15548/nsc.v5i1.894>.
- Rahaju, E. B., Fardah, D. K., Prandoyo, W., & Ismail. (2020). Kemampuan Guru-Guru Matematika SMP Kabupaten Ponorogo dalam Mengembangkan Soal Berpikir Tingkat Tinggi. *Jurnal Pendidikan Matematika Raflesia*, 05(01), 75–81. <https://doi.org/10.33449/jpmr.v5i1.10640>.
- Raharjo, M. W. C., Suryati, S., & Khery, Y. (2017). Pengembangan E-Modul Interaktif Menggunakan Adobe Flash Pada Materi Ikatan Kimia Untuk Mendorong Literasi Sains Siswa. *Hydrogen: Jurnal Kependidikan Kimia*, 5(1), 8. <https://doi.org/10.33394/hjkk.v5i1.102>.
- Rosmawanti, R., Mutaqin, A., & Ihsanudin. (2020). Pengembangan E-Modul dengan Model Pembelajaran Knisley Menggunakan Platform Android sebagai Alternatif Pembelajaran Trigonometri SMA. *Jurnal Pendidikan Matematika*, 11(1), 67–76. <https://doi.org/10.36709/jpm.v12i2.19057>.
- Sa'diyah, K. (2021). Pengembangan E-Modul Berbasis Digital Flipbook Untuk Mempermudah Pembelajaran Jarak Jauh Di SMA. *Edukatif: Jurnal Ilmu Pendidikan*, 3(4), 1298–1308. <https://doi.org/10.31004/edukatif.v3i4.561>.
- Satria Dewi Pendit, S., Amelia, C., Piloc, N. A., & Sari Sitepu, M. (2022). Pengembangan E-Modul Discon Berbasis Android (E-Modul Disroid) Materi Bunyi Bagi Siswa Sekolah Dasar. *Scaffolding: Jurnal Pendidikan Islam dan Multikulturalisme*, 4(3), 179. <https://doi.org/10.37680/scaffolding.v4i3.1941>.
- Solihudin JH, T. (2018). Pengembangan E-Modul Berbasis Web Untuk Meningkatkan Pencapaian Kompetensi Pengetahuan Fisika Pada Materi Listrik Statis Dan Dinamis SMA. *WaPFI (Wahana Pendidikan Fisika)*, 3(2), 51. <https://doi.org/10.17509/wapfi.v3i2.13731>.
- Solikin, I. (2018). Implementasi E-Modul pada Program Studi Manajemen Informatika Universitas Bina Darma Berbasis Web Mobile. *Jurnal RESTI (Rekayasa Sistem dan Teknologi Informasi)*, 2(2), 492–497. <https://doi.org/10.29207/resti.v2i2.393>.
- Sugiharti, S. D., Supriadi, N., & Andriani, S. (2019). Efektivitas Model Learning Cycle 7E Berbantuan E-Modul untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik SMP. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 8(1). <https://doi.org/10.24127/ajpm.v8i1.1573>.
- Sugiyono. (2017). *Metode Penelitian (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Alfabeta.
- Syafa, I. P., Putri, M., Setiawati, N. Z. E., & Marini, A. (2022). Pengaruh Media Pembelajaran Literasi Berbasis E-Modul Terhadap Pembentukan Karakter Siswa Sekolah Dasar (Studi Literatur). *Jurnal Pendidikan Dasar dan Sosial Humaniora*, 2(2), 313–328. <https://doi.org/10.53625/jpdsh.v2i2.4228>.
- Utami, R. W., Endaryono, B. T., & Djuhartono, T. (2020). Meningkatkan Kemampuan Berpikir Kreatif Matematis Siswa Melalui Pendekatan Open-Ended. *Faktor Jurnal Ilmiah Kependidikan*, 7(1), 43–48. <https://doi.org/10.30998/fjik.v7i1.5328>.
- Wahyuni, D., Sari, M., & Hurriyah. (2020). Efektifitas E-Modul Berbasis Problem Solving Terhadap



- Keterampilan Berfikir Kritis Peserta Didik. *Natural Science*, 6(2). <https://doi.org/10.15548/nsc.v6i2.1709>.
- Wijaya, Y., Priyatama, A. N., & Khasan, M. (2020). Dukungan Sosial Keluarga dengan Minat Berwirausaha Siswa Sekolah Menengah Kejuruan (SMK). *Jurnal Psikologi Perseptual*, 5(2). <https://doi.org/10.24176/perseptual.v5i2.5050>.
- Winatha, K. R., Naswan, S., & Ketut, A. (2018). Pengembangan E-modul Interaktif Berbasis Proyek Pada Mata Pelajaran Simulasi Digital Kelas X di SMK TI Bali Global Singaraja. *Jurnal Teknologi Pembelajaran Indonesia*, 8(1). <https://doi.org/10.23887/jtpi.v8i1.2238>.
- Winatha, K. R., Suharsono, N., & Agustin, K. (2018). Pengembangan E-Modul Interaktif Berbasis Proyek Matematika. *Jurnal Pendidikan Teknologi dan Kejuruan*, 4(2), 188-199.
- Zaini, M., & Soenarto, S. (2019). Persepsi Orangtua Terhadap Hadirnya Era Teknologi Digital di Kalangan Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 3(1), 254. <https://doi.org/10.31004/obsesi.v3i1.127>.