



## Interactive E-Module Based on Scientific Approach in Science Content Learning for Sixth-Grade Students

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### ARTICLE INFO

#### Article history:

Received March 27, 2023

Accepted July 10, 2023

Available online July 25, 2023

#### Kata Kunci:

E-Modul, Pendekatan Ilmiah, ADDIE

#### Keywords:

E-Module, Scientific Approach, ADDIE



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### ABSTRAK

Rendahnya hasil belajar IPA siswa sekolah dasar disebabkan karena kurangnya penggunaan media serta bahan ajar yang dapat menarik minat belajar siswa. Adapun tujuan dari penelitian ini yakni mengembangkan e-modul interaktif berbasis *scientific approach* dalam pembelajaran muatan IPA pada siswa kelas kelas VI SD. Penelitian ini tergolong kedalam jenis penelitian pengembangan, yang dikembangkan dengan menggunakan model ADDIE. Subjek yang terlibat dalam penelitian ini yakni 1 orang uji ahli isi mata pelajaran, 1 orang ahli desain pembelajaran, 1 orang ahli media pembelajaran dan dua subjek uji produk yakni 3 orang uji coba perorangan dan 9 orang uji coba kelompok kecil. Pengumpulan data dalam penelitian dilakukan menggunakan metode observasi, wawancara, kusioner dan tes, dengan instrument penelitian berupa kusioner. Data dianalisis dengan teknik analisis data kualitatif, analisis data deskriptif kuantitatif, dan teknik analisis data statistika inferensial (*uji-t*). Hasil analisis data menunjukkan bahwa hasil review ahli isi mata pelajaran memperoleh persentase sebesar 85,33% dengan kualifikasi baik, ahli desain pembelajaran sebesar 95,71% dengan kualifikasi sangat baik, ahli media pembelajaran sebesar 92,5% dengan kualifikasi sangat baik, hasil uji coba perorangan memperoleh persentase sebesar 92% dengan kualifikasi sangat baik, dan hasil uji coba kelompok kecil memperoleh persentase sebesar 95,77% dengan kualifikasi sangat baik. Disimpulkan media e-modul interaktif berbasis *scientific approach* efektif digunakan untuk meningkatkan hasil belajar IPA siswa kelas VI SD.

### ABSTRACT

The low science learning outcomes of elementary school students are due to the need for more use of media and teaching materials that can attract students' interest in learning, so to overcome these problems, learning media such as e-modules based on a scientific approach are needed. This study aims to determine the design, feasibility, and effectiveness of scientific approach-based interactive e-modules in learning science content for sixth-grade elementary school students. This research belongs to the type of development research which was developed using the ADDIE model. The subjects involved in this study were 1 subject matter expert test, 1 instructional design expert, 1 instructional media expert, and two product test subjects, namely 3 individual test subjects and 9 small group tryouts. Data collection in the study was carried out using observation, interview, questionnaire, and test methods, with research instruments in the form of expert learning questionnaires and individual and small group trial instruments. The data obtained in the study were then analyzed using qualitative data analysis techniques, quantitative descriptive data analysis, and inferential statistical data analysis techniques (*t-test*). The results of the data analysis showed that the results of the review by subject content experts obtained a percentage of 85.33% with good qualifications, the results of the review by learning design experts obtained a percentage of 95.71% with very good qualifications, the results of the review by learning media experts obtained a percentage of 92.5 % with very good qualifications, the results of reviews from students through individual trials obtained a percentage of 92% with very good qualifications, and the results of reviews from students through small group trials obtained a percentage of 95.77% with very good qualifications. So, interactive e-module media based on a scientific approach effectively improves science learning outcomes for sixth-grade elementary school students.

## 1. INTRODUCTION

Learning is a process of delivering information from educators to students. An education is said to be successful if the educational goals can be carried out properly and can be used as a benchmark for teachers in determining the basic competencies that have been possessed and those that have not, and to find out the learning difficulties of students in class (Pane & Dasopang, 2017; Sujana, 2019). In Indonesia, education is not only carried out to develop academic abilities but also implemented to develop students' thinking skills through the various subjects presented (Marwah et al., 2018; Mubarok, 2021). One of the subjects taught to elementary school students is science or natural sciences. Natural Sciences is one of the subject matter which is carried out by developing organized knowledge, ideas, and concepts about the natural surroundings, which are obtained through a series of scientific process experiences that include investigating, compiling, and presenting the ideas of the nature of learning Natural Sciences (Kimianti & Prasetyo, 2019; Raqzitya et al., 2022; Wiratama & Margunayasa, 2021). One of the goals of learning science is to increase and develop curiosity, skills, and knowledge or understanding of science and to be able to maintain or preserve the natural environment around us (Herawati & Muhtadi, 2018; Qoridatullah et al., 2021; Widiastuti, 2021). Science learning activities at the elementary school age level must be implemented in a fundamental and real way. In addition, science learning is also desired to be a place for students to be able to learn about themselves and the nature that exists in their environment, as well as further development processes to be applied in everyday life (Jannah & Atmojo, 2022; Wati et al., 2022; Widiastuti, 2021). Students who can understand science learning well will be able to think critically and systematically in understanding their surroundings and themselves (Santika et al., 2022).

The reality shows that the science learning process has yet to be carried out optimally, as indicated by the number of students who still have scores below the average (Kuswanto, 2019; Murdianingsih & Sumarno, 2022). It is in line with the results of observations and interviews that have been carried out at SD Negeri 1 Padangbulia. The observations and interviews showed that of the 22 sixth-grade students of SD, 19 students (76%) still scored below the minimum completeness criteria in science subjects. It showed that most sixth-grade students at SD Negeri 1 Padangbulia had not fulfilled the minimum completeness criteria. The low student learning outcomes are caused by the teacher's learning process, limited to applying the lecture method, question and answer, assignments, and groups. In addition, the learning media used are only limited to textbooks provided by the school. If left continuously, this will impact not achieving learning objectives. Based on this, it is necessary to use learning media that are to the characteristics of students to make it easier to achieve learning goals.

One of the media that can be used in the science learning process is learning media in the form of interactive e-modules. E-module is a modified form of conventional teaching modules that contains various teaching material units (Asrial et al., 2020). With technological advances in the digital era, printed modules can be developed into electronic modules, commonly known as e-modules. E-module is an electronic teaching material that contains various teaching materials and is accompanied by text, images in animated form, learning methods, evaluation tools, graphics, and videos (Herawati & Muhtadi, 2018; Padwa & Erdi, 2021; Ricu & Najuah, 2020). The characteristics of the E-module are generally the same as the characteristics of the learning module, namely having clear instructions (self-instruction), learning material that can be studied by students themselves (self-contained), not dependent on other teaching materials (stand-alone), and easy to use (adaptive and user-friendly) (Asrial et al., 2020; Dewi & Lestari, 2020; Ferdiani & Pranyata, 2022). The use of e-modules in the learning process has several benefits, such as making it easier for students to study independently using cellphones or computers, allowing media to access anywhere and anytime to facilitate the student learning process, and increasing student motivation and enthusiasm for learning because it is interactive and contains various images, audio, video, animation, as well as formative tests/quizzes (Khanna & Kareem, 2021; Masrurroh & Agustina, 2021; Sutama et al., 2021). Applying e-modules in science learning will be more effective if accompanied by a scientific approach. The scientific approach allows students to learn actively by developing their thinking skills (Lestari & Listiadi, 2021; Putri et al., 2021).

The scientific approach is a scientific learning approach that aims to develop students' skills in observing, classifying, measuring, predicting, explaining, and concluding a problem (Handican & Setyaningrum, 2021; Rohita et al., 2018). Such a learning process is very much needed in science learning, where science learning requires students to develop their abilities through a scientific process. Several previous studies have revealed that developing interactive e-modules based on a scientific approach can make learning easier for students (Lestari & Listiadi, 2021). The results of other studies also agree with this, which states that scientific approach-based interactive e-modules can improve student learning outcomes (Indariani et al., 2018; Munawar et al., 2020). Based on some of these research results, applying interactive e-modules based on a scientific approach can positively influence student learning outcomes. In previous studies, no studies specifically discussed the development of scientific approach-based interactive e-

modules in science content learning for sixth-grade students. So, this research is focused on this study to know the design, feasibility, and effectiveness of scientific approach-based interactive e-modules in learning science content in sixth-grade elementary school students.

**2. METHOD**

This research belongs to the type of development research which was developed using the ADDIE model. The ADDIE development model comprises the analysis, design, development, implementation, and evaluation stages. The ADDIE model was developed systematically and is guided by a theoretical foundation of learning design. The subjects in this study were 1 subject matter expert test, 1 instructional design expert, 1 instructional media expert, and two product test subjects, namely 3 individual trials and 9 small group trials. Collecting data in the study was carried out using observation, interviews, questionnaires, and tests. Observation and interview methods in this study were used to analyze the needs of student characteristics and competency analysis.

Meanwhile, the questionnaire method was carried out to determine the validity and effectiveness of the application and to measure the feasibility of interactive e-modules based on a scientific approach. The instruments used in data collection were expert questionnaires on learning content, learning designs, and learning media, as well as individual and small-group trial instruments. The results obtained in the study were then analyzed using qualitative data analysis techniques, quantitative descriptive data analysis, and inferential statistical data analysis techniques (t-test). Table 1, Table 2, Table 3, and Table 4 present the grids used to prepare the instrument.

**Table 1. Subject Content Expert Instruments**

No.	Aspect	Indicator	Item Number
1	Curriculum	a. Clarity of subject identity	1
		b. Suitability of e-module with learning indicators	2
		c. Appropriateness of learning e-modules with learning objectives	3
		d. Appropriateness of learning objectives with learning indicators	4
		e. Learning objectives according to the ABCD format	5
2	Material	a. The material provided is coherent	6
		b. The suitability of the material with the learning objectives	7
		c. The material is free from concept errors	8
		d. Clarity of presentation of the material	9
		e. The material presented is easy to understand	10
		f. Compatibility of the material with the picture	11
		g. Compatibility of the material with the video	12
3	Language	a. Use clear and concise sentences	13
4	Evaluation	a. The proportion of practice questions is balanced with the material provided	14
		b. The questions given are easy to understand	15

**Table 2. Instructional Design Expert Instruments**

No.	Aspect	Indicator	Item Number
1	Curriculum	a. Clarity of subject identity	1
		b. Conformity of indicators with basic competencies	2
		c. Material suitability with indicators	3
		d. The suitability of the material with the learning objectives	4
2	Method	a. Clarity of learning design	5
		b. Clarity of study instructions	6
		c. Appropriateness of the order of presentation of teaching material	7
		d. E-modules motivate students to learn	8
		e. The accuracy of the application of learning strategies	9
		f. Adequacy of teaching material support in e-modules	10
3	Evaluation	a. Availability of the assessment presented	11
		b. Clarity of work on assignment instructions/tests	12
		c. Clarity of assessment of learning outcomes	13
		d. Relevance of questions with learning objectives	14

**Table 3. Instruments of Learning Media Experts**

No.	Aspect	Indicator	Item Number
1	Appearance	a. Appropriate type, color, spacing, and font size	1
		b. Text readability level	2
		c. Text rendering accuracy	3
		d. Accurate use of symbols and punctuation	4
		e. Word choice accuracy	5
		f. Correct text color with background color	6
		g. Compatibility of images with text messages (material)	7
		h. Image conformity with the description	8
		i. Compatibility of image layout with text	9
		j. Images are easy to understand	10
		k. Compatibility of the video with the material	11
		l. Videos are easy to understand	12
		m. The clarity of the information presented in the video	13
2	Technical	a. The e-module is easy to use	14
		b. Navigation on the e-module works fine	15
		c. Clarity of instructions for using the e-module	16

**Table 4. Individual and Small-Group Trial Instruments**

No.	Aspect	Indicator	Item Number
1	Material	a. The material presented in the e-module is clear and easy to understand	1
2	Appearance	a. The writing in the e-module is clear	2
		b. The voice in the learning video is clear	3
		c. The language used in the e-module can be understood	4
		d. The use of examples in the video makes it easier to understand	5
		e. material	6
		f. The images used in the e-module are attractive	7
3	Evaluation	a. The practice questions in the e-module are easy to understand because they are appropriate	8
		b. sample material	9
4	Motivation	a. The instructions for working on the questions are clear and easy to understand	10

### 3. RESULT AND DISCUSSION

#### Result

The presentation of the research results is divided into three aspects, namely describing the design, validity, and effectiveness of developing an interactive e-module based on a scientific approach to science learning content in sixth grade SD Negeri 1 Padangbulia. First, the development of an interactive e-module based on a scientific approach was developed using the ADDIE development model, which consists of five stages of development, namely the analysis stage. At this stage, the results of the analysis of student learning characteristics and problems are obtained. The results obtained were that among the 25 students, there were 19 students (76%) still scored below the minimum completeness criteria in science subjects. Due to the lack of innovative learning media, students tend to get bored easily and need help understanding and participating in learning. In addition to competency analysis with the results in this study, the material to be discussed is discussions with subject teachers and analyzing school facilities in the form of projectors and computers. The second development stage is the design stage, which is carried out to design storyboards and e-module flowcharts by preparing concepts, materials, and software used to develop e-modules, preparing assessment instruments, compiling lesson plans, and making test questions.

The third stage is the development stage, which is carried out by making e-modules and conducting tests on experts and students to determine the validity and practicality of the e-modules. The fourth stage is the implementation stage. At this stage, the e-module is implemented to measure the efficiency and effectiveness of the products made. The fifth stage is the evaluation stage, where at this last stage, an analysis of the inputs and deficiencies of the e-module teaching materials is carried out, which aims to



determine the feasibility and evaluate the products that have been developed. The appearance of the e-module can be seen in Figure 1, Figure 2, and Figure 3.



Figure 1. Display of the E-Module Cover



Figure 2. Display of E-Module Material

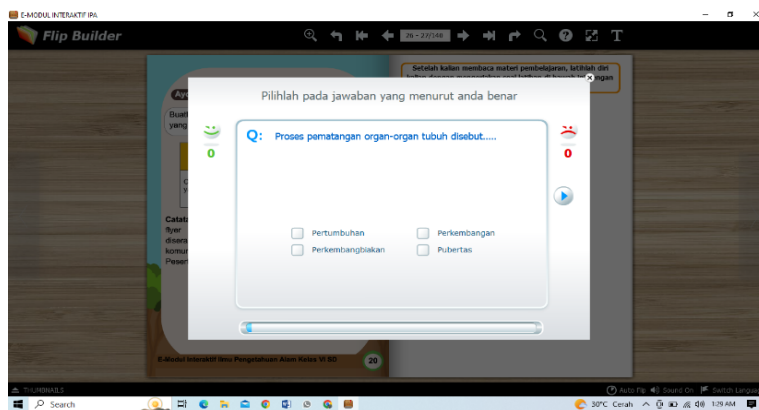


Figure 3. Quiz Display

Second, testing the validity of the e-module is carried out through expert tests and product trials to determine the validity and feasibility of these products for use in the learning process in the classroom in related subjects. The results of the validity of the e-module are presented in Table 5.

Table 5. Percentage of Validity Test Results for Developing E-Modules

No.	Trial Subjects	Validity Results	Qualification
1	Subject Content Expert Test	85,33%	Good
2	Learning Design Expert Test	95,71%	Very good
3	Learning Media Expert Test	92,5%	Very good
4	Individual Trial	92%	Very good
5	Small Group Trial	95,77%	Very good

The validity of the development results was obtained through subject content expert trials, instructional design expert trials, instructional media expert trials, individual trials, and small group trials using the questionnaire data collection method. The subject matter expert test validation results obtained a score percentage of 85.33% with good qualifications. The validation results of the learning design expert test obtained a score percentage of 95.71% with very good qualifications. The validation results of the learning media expert test obtained a score percentage of 92.5% with very good qualifications. The results of the individual trial validation obtained a score percentage of 92% with very good qualifications. Then, finally, the results of the small group trial validation obtained a score percentage of 95.77% with very good qualifications. Based on the obtained validity results, this teaching material is feasible for use in the learning process of natural science content.

Third, testing the effectiveness of the development results is obtained through the prerequisite test, namely the normality test and homogeneity test. The results of the calculation of the normality test using the Shapiro Wilk formula in the pretest data group  $X^2_{count} = 0.937$  while  $X^2_{table} = 0.911$  and in the posttest data group  $X^2_{count} = 0.941$  while  $X^2_{table} = 0.911$ . So  $X^2_{count} > X^2_{table}$  with a significance level of 5% so

that all data scores on science learning outcomes are normally distributed. The results of the calculation of the homogeneity test using the Fisher formula obtained  $F_{count} = 2.002$  while  $F_{table} = 2.084$  with a significance level of 5%.  $F_{count} < F_{table}$ , so the two data have a homogeneous variance. Based on the results of testing the effectiveness of this e-module on students through the pretest and posttest, the value of count = 6.876 is obtained, while table = 2.086. It can be concluded that  $t_{count} > t_{table}$  so that  $H_0$  is rejected and  $H_1$  is accepted. This means a significant difference (5%) in student learning outcomes before and after using the Scientific Approach-Based Interactive E-module in Science Content Learning for Class VI Students of SD Negeri 1 Padangbulia in the 2022/2023 Academic Year. So, the Scientific Approach-Based Interactive E-module effectively improves science learning outcomes.

## Discussion

The results of the data analysis show that the learning media in the form of interactive e-modules based on a scientific approach has gone through a series of development terms and has been validated by experts. Trials have been carried out on students. Based on the results of the validity that has been carried out, it states that the interactive e-module based on the scientific approach is declared valid with very good quality and is suitable for assisting the science learning process for sixth-grade students at SD Negeri 1 Padangbulia. This development research uses the ADDIE development model, which has 5 stages: analysis, design, development, implementation, and evaluation (Arifin et al., 2018; Cahyadi, 2019). Developing teaching materials using the ADDIE learning model effectively creates learning product development suitable for use during the learning process (Rosdianto et al., 2019; Ulum et al., 2020). Very good qualification results are obtained due to compatibility between indicators, goals, and competencies with the material, making it easier for students to use teaching materials to understand the material (Lilis, 2019; Mella et al., 2022). The presentation of teaching materials is adjusted to the aspects and characteristics of student needs so that the delivery of learning objectives has an impact and improves the quality of student learning (Hae et al., 2021; Nurrita, 2018). Clarity regarding indicators and preparation of learning objectives can result in better learning outcomes (Djalal, 2017; Neni Isnaeni & Dewi Hildayah, 2020).

Second, an interactive e-module based on a scientific approach is feasible because it can make it easier for students to carry out the learning process. Presentation of material carried out regularly and arranged interestingly so that it can be presented in a structured manner. Presentation of material added with images, audio, and video as components makes the material conveyed interestingly and easier for students to understand the material (Santika et al., 2022; Setiyawan, 2021). It impacts students, making it easier for them to understand the material and be more motivated to learn. Thus, an interactive e-module based on a scientific approach can make it easier for students to understand the material and can help improve student learning outcomes (Lestari & Listiadi, 2021; Putri et al., 2021). Third, an interactive e-module based on a scientific approach can increase students' enthusiasm for independent learning (Asrial et al., 2020; Dewi & Lestari, 2020; Ferdiani & Pranyata, 2022). In this scientific approach-based interactive e-module, practice questions and learning videos can test the extent to which students understand learning material. Images, audio, and video are also available on media to attract students' interest in using the media (Fitriani, 2021; Wisada et al., 2019).

Fourth, an interactive e-module based on a scientific approach can increase students' enthusiasm for learning. The selection of learning models should increase student activity in learning so that student learning outcomes increase (Wahyuningtyas & Sulasmono, 2020). Students must be able to think critically by solving problems with the teacher (Lilis, 2019; Wulandari & Suparno, 2020). By having this ability, students will be able to solve problems that will be experienced during the learning process. This interactive e-module based on a scientific approach effectively increases student enthusiasm for learning. The results obtained in this study align with previous research results, which also revealed that developing an interactive e-module based on a scientific approach can make it easier for students to carry out the learning process (Lestari & Listiadi, 2021). The results of other studies also agree with this, which states that scientific approach-based interactive e-modules can improve student learning outcomes (Indariani et al., 2018; Munawar et al., 2020). Based on some of the results of these studies, applying an interactive e-module based on a scientific approach can positively influence student learning outcomes.

## 4. CONCLUSION

The interactive e-module based on the scientific approach was declared effective based on the results of the review/assessment test on experts and product tests on students with very good qualifications. So, developing an interactive e-module based on a scientific approach is feasible for the learning process. Interactive e-modules based on a scientific approach can increase the effectiveness of

students in independent learning and assist teachers in facilitating the learning process with the help of technology, which has an impact on increasing student learning outcomes.

## 5. REFERENCES

- Arifin, R. W., Septanto, H., & Wignyowiyoto. (2018). Development of Animated Video-Based Learning Media with ADDIE Model in Blended Learning Activities. *Information Management For Educators And Professionals*, 2(2), 179–188. <https://ejournal-binainsani.ac.id/index.php/IMBI/article/view/946>.
- Asrial, A., Syahrial, S., Maison, M., Kurniawan, D. A., & Piwana, S. O. (2020). Ethnoconstructivism E-Module To Improve Perception, Interest, And Motivation Of Students In Class V Elementary School. *JPI (Jurnal Pendidikan Indonesia)*, 9(1), 30. <https://doi.org/10.23887/jpi-undiksha.v9i1.19222>.
- Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. *Halaqa: Islamic Education Journal*, 3(1), 35–42. <https://doi.org/10.21070/halaqa.v3i1.2124>.
- 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). <https://doi.org/10.23887/jipp.v4i3.28035>.
- Djalal, F. (2017). Optimalisasi Pembelajaran Melalui Pendekatan, Strategi, dan Model Pembelajaran. *Jurnal Dharmawangsa*, 2(1), 31–52. <https://jurnal.dharmawangsa.ac.id/index.php/sabilarrasyad/article/view/115>.
- Ferdiani, R. D., & Pranyata, Y. (2022). E-Modul berbasis STEM PbJL untuk Meningkatkan Kemampuan Berpikir Kreatif Selama Pandemi Covid-19. *Aksioma: Jurnal Program Studi Pendidikan Matematika*, 11(3), 1875–1885. <https://doi.org/10.24127/ajpm.v11i3.5141>.
- Fitriani, Y. (2021). Pemanfaatan Media Sosial Sebagai Media Penyajian Konten Edukasi Atau Pembelajaran Digital. *Journal of Information System, Applied, Management, Accounting and Research*, 5(4), 1006–1013. <https://doi.org/10.52362/jisamar.v5i4.609>.
- Hae, Y., Tantu, Y. R. P., & Widiastuti, W. (2021). Penerapan Media Pembelajaran Visual Dalam Membangun Motivasi Belajar Siswa Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, 3(4), 1177–1184. <https://doi.org/10.31004/edukatif.v3i4.522>.
- Handican, R., & Setyaningrum, W. (2021). Developing a Mobile Game Using a Scientific Approach to Support Mathematics Learning. *Edumatika: Jurnal Riset Pendidikan Matematika*, 4(1), 47–58. <https://doi.org/10.32939/ejrpm.v4i1.607>.
- Herawati, N. S., & Muhtadi, A. (2018). Pengembangan modul elektronik (e-modul) interaktif pada mata pelajaran Kimia kelas XI SMA. *Jurnal Inovasi Teknologi Pendidikan*, 5(2), 180–191. <https://doi.org/10.21831/jitp.v5i2.15424>.
- Indariani, A., Amami Pramuditya, S., & Firmasari, S. (2018). Pengembangan Bahan Ajar Digital Berbasis Kemampuan Pemecahan Masalah Matematis Pada Pembelajaran Matematika (Bahan Ajar Digital Interaktif pada Materi Pertidaksamaan Nilai Mutlak Linear Satu Variabel). *Eduma: Mathematics Education Learning and Teaching*, 7(2), 89–98. <https://doi.org/10.24235/eduma.v7i2.3670>.
- Jannah, D. R. N., & Atmojo, I. R. W. (2022). Media Digital dalam Memberdayakan Kemampuan Berpikir Kritis Abad 21 pada Pembelajaran IPA di Sekolah Dasar. *Jurnal Basicedu*, 6(1), 1064–1074. <https://doi.org/10.31004/basicedu.v6i1.2124>.
- Khanna, R., & Kareem, D. J. (2021). Creating inclusive spaces in virtual classroom sessions during the COVID pandemic: An exploratory study of primary class teachers in India. *International Journal of Educational Research Open*, 2(2), 100038. <https://doi.org/10.1016/j.ijedro.2021.100038>.
- Kimianti, F., & Prasetyo, Z. K. (2019). Pengembangan E-Modul IPA Berbasis Problem Based Learning Untuk Meningkatkan Literasi Sains Siswa. *Kwangsan: Jurnal Teknologi Pendidikan*, 7(2), 91. <https://doi.org/10.31800/jtp.kw.v7n2.p91--103>.
- Kuswanto, J. (2019). Pengembangan Modul Interaktif Pada Mata Pelajaran IPA Terpadu Kelas VIII. *Jurnal Media Infotama*, 15(2), 51–56. <https://doi.org/10.37676/jmi.v15i2.866>.
- Lestari, S. I., & Listiadi, A. (2021). Pengembangan bahan ajar e-book berbasis scientific approach mata pelajaran praktikum akuntansi perusahaan manufaktur. *Akuntabel: Jurnal Akuntansi Dan Keuangan*, 18(2), 360–369. <https://doi.org/10.30872/jakt.v18i2.9767>.
- Lilis. (2019). Pengembangan Bahan Ajar Digital pada Mata Pelajaran Dasar Listrik dan Elektronika Kelas X. *Jurnal Teknologi Pendidikan Dan Pembelajaran*, 6(2), 156–168. <https://jurnal.untirta.ac.id/index.php/JTPPM/article/view/7423>.
- Marwah, S. S., Syafe'i, M., & Sumarna, E. (2018). Relevansi Konsep Pendidikan Menurut Ki Hadjar Dewantara Dengan Pendidikan Islam. *Tarbawy: Indonesian Journal of Islamic Education*, 5(1), 14. <https://doi.org/10.17509/t.v5i1.13336>.
- Masruroh, D., & Agustina, Y. (2021). E-modul berbasis Android sebagai pendukung pembelajaran daring dan upaya untuk meningkatkan hasil belajar peserta didik. *Jurnal Ekonomi, Bisnis Dan Pendidikan*,

- 1(6), 559–568. <https://doi.org/10.17977/um066v1i62021p559-568>.
- Mella, B., Wulandari, I. G. A. A., & Wiarta, I. W. (2022). Bahan Ajar Digital Interaktif Berbasis Problem Based Learning Materi Keragaman Budaya. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 6(1), 127–136. <https://doi.org/10.23887/jppp.v6i1.46368>.
- Mubarok, R. (2021). Dinamika Lembaga Pendidikan Dasar Dalam Pengelolaan Pembelajaran Daring. *Pedagogi: Jurnal Ilmu Pendidikan*, 21(1), 10–20. <https://doi.org/10.24036/pedagogi.v21i1.1033>.
- Munawar, B., Hasyim, A. F., & Ma'arif, M. (2020). Desain Pengembangan Bahan Ajar Digital Berbantuan Aplikasi Animaker. *Jurnal Golden Age*, 4(2), 310–320. <https://doi.org/10.29408/goldenage.v4i02.2473>.
- Murdianingsih, A. K., & Sumarno, J. S. (2022). Pengembangan Media Pembelajaran Comic Book IPA untuk Meningkatkan Keterampilan Berpikir Kritis dan Karakter Peduli Lingkungan. *Jurnal Kualita Pendidikan*, 3(2), 46–52. <http://journal.kualitama.com/index.php/jkp/article/view/297>.
- Neni Isnaeni, & Dewi Hildayah. (2020). Media Pembelajaran Dalam Pembentukan Interaksi Belajar Siswa. *Jurnal Syntax Transformation*, 1(5), 148–156. <https://doi.org/10.46799/jst.v1i5.69>.
- Nurrita. (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. *Misykat*, 3(1), 171–187. <https://doi.org/10.33511/misykat.v3i1.52>.
- Padwa, T. R., & Erdi, P. N. (2021). Penggunaan E-Modul Dengan Sistem Project Based Learning. *Javit : Jurnal Vokasi Informatika*, 1(1), 21–25. <https://doi.org/10.24036/javit.v1i1.13>.
- Pane, A., & Dasopang, M. D. (2017). Belajar Dan Pembelajaran. *Fitrah:Jurnal Kajian Ilmu-Ilmu Keislaman*, 3(2), 333. <https://doi.org/10.24952/fitrah.v3i2.945>.
- Putri, K., Muchtar, Z., & Darmana, A. (2021). Develop an Android-Based Learning Media Integrated with a Scientific Approach to the Colligative Solution's Nature. *Budapest International Research and Critics in Linguistics and Education (Birle) Journal*, 4(1), 322–329. <https://doi.org/10.33258/birle.v4i1.1605>.
- Qoridatullah, A., Hidayat, S., & Sudrajat, A. (2021). Pengembangan E-Modul Berorientasi High Order Thinking Skills (HOTS) Pada Mata Pelajaran Ilmu Pengetahuan Alam (IPA) Kelas VI Sekolah Dasar. *Jurnal Muara Pendidikan*, 6(1), 33–40. <https://doi.org/10.52060/mp.v6i1.494>.
- Raqzitya, F. A., Agung, A., & Agung, G. (2022). E-Modul Berbasis Pendidikan Karakter Sebagai Sumber Belajar IPA Siswa Kelas VII. *Jurnal Edutech Undiksha*, 10(1), 108–116. <https://doi.org/10.23887/jeu.v10i1.41590>.
- Ricu, S., & Najuah. (2020). Pengembangan E-Modul Interaktif Berbasis Android pada Mata Kuliah Strategi Belajar Mengajar. *Jurnal Pendidikan Sejarah*, 9(1), 1–14. <https://doi.org/10.21009/JPS.091.01>.
- Rohita, R., Fitria, N., Bustan, R., & Haryadi, D. (2018). Teacher's Understanding of the Scientific Approach in the 2013 Curriculum for Early Childhood Education. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 2(2), 235. <https://doi.org/10.31004/obsesi.v2i2.105>.
- Rosdianto, H., Sulistri, E., & Munandar, N. (2019). Penerapan Model Pembelajaran ADDIE Untuk Meningkatkan Keterampilan Proses Sains Siswa Pada Materi Kinematika Gerak Lurus. *Jurnal Pendidikan Fisika Dan Keilmuan (JPFK)*, 5(1), 53. <https://doi.org/10.25273/jpfk.v5i1.2947>.
- Santika, I. G. N., Suastra, I. W., & Arnyana, I. B. P. (2022). Membentuk Karakter Peduli Lingkungan Pada Siswa Sekolah Dasar Melalui Pembelajaran IPA. *Jurnal Education and Development Institut Pendidikan Tapanuli Selatan*, 10(1), 207–212. <http://journal.ipts.ac.id/index.php/ED/article/view/3382>.
- Setiyawan, H. (2021). Pemanfaatan Media Audio Visual dan Media Gambar Pada Siswa Kelas V. *Jurnal Prakarsa Paedagogia*, 3(2). <https://doi.org/10.24176/jpp.v3i2.5874>.
- Sujana, I. W. C. (2019). Fungsi Dan Tujuan Pendidikan Indonesia. *Adi Widya: Jurnal Pendidikan Dasar*, 4(1), 29. <https://doi.org/10.25078/aw.v4i1.927>.
- Sutama, I. W., Astuti, W., & Anisa, N. (2021). E-Modul Strategi Pembelajaran Anak Usia Dini Sebagai Sumber Belajar Digital. *Jurnal Pendidikan Anak Usia Dini Undiksha*, 9(3), 449. <https://doi.org/10.23887/paud.v9i3.41385>.
- Ulum, M. K., S, E. E., & Ysh, A. S. (2020). Keefektifan Model Pembelajaran Addie Terhadap Hasil Belajar Matematika. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 4(1), 98. <https://doi.org/10.23887/jppp.v4i1.24774>.
- Wahyuningtyas, R., & Sulasmono, B. S. (2020). Pentingnya Media dalam Pembelajaran Guna Meningkatkan Hasil Belajar di Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, 2(1), 23–27. <https://doi.org/10.31004/edukatif.v2i1.77>.
- Wati, E., Harahap, R. D., & Safitri, I. (2022). Analisis Karakter Siswa pada Mata Pelajaran IPA di Sekolah Dasar. *Jurnal Basicedu*, 6(4), 5994–6004. <https://doi.org/10.31004/basicedu.v6i4.2953>.
- Widiastuti, N. L. G. K. (2021). E-Modul dengan Pendekatan Kontekstual pada Mata Pelajaran IPA. *Jurnal Imiah Pendidikan Dan Pembelajaran*, 5(3), 435. <https://doi.org/10.23887/jipp.v5i3.37974>.
- Wiratama, G. N. K., & Margunayasa, I. G. (2021). E-Modul Interaktif Muatan IPA Pada Sub Tema 1 Tema 5.



- Mimbar PGSD Undiksha*, 9(2), 258–267. <https://doi.org/10.23887/jjgsd.v9i2.34805>.
- Wisada, P. D., Sudarma, I. K., & Yuda S, A. I. W. I. (2019). Pengembangan Media Video Pembelajaran Berorientasi Pendidikan Karakter. *Journal of Education Technology*, 3(3), 140. <https://doi.org/10.23887/jet.v3i3.21735>.
- Wulandari, A., & Suparno, S. (2020). Pengaruh Model Problem Based Learning terhadap Kemampuan Karakter Kerjasama Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 4(2), 862. <https://doi.org/10.31004/obsesi.v4i2.448>.