

Effectiveness of Using Problem-Based Electronic Modules on Agreement Materials for Students

Hamidah Ulfa Fauziah ^{a,*}, Peni Sekarsari ^b, Wikan Sasmita ^c, Fadilla Qaisya Huda ^d

^{a, b} Yogyakarta State University, Indonesia

^c PGRI Nusantara University Kediri, Indonesia

^d Albukhary International University, Malaysia

*Corresponding author: hamidah0023fishipol.2023@student.uny.ac.id

Received: July 15, 2024; Accepted: August 6, 2024; Published: October 16, 2024

ABSTRACT: This research aims to develop and test the effectiveness of a problem-based e-module assisted by a flipbook maker application for contract legal materials. A problem in civil and business law is something that must be studied by students in order to be able to resolve or solve a problem through the scientific method stage. This research uses the writing and development procedures proposed by Borg and Gall. The development study produced a product in the form of a problem-based e-module assisted by a flipbook maker with effective contract law materials. The product effectiveness test was based on the results of a large group test, namely the average pre-test score was 57.82 while the post-test score was 72.05. This shows an increase in the average obtained by students, namely 14.23.

Keywords: e-module, problem based, flipbook maker

INTRODUCTION

The development of print media with computer technology has fostered new innovations to create teaching materials in the form of e-modules that can be used in implementing learning activities. E-module is an e-learning based application used in learning activities which combines information and communication technology into an electronic device [1]. E-modules are one of the teaching materials to improve understanding of theoretical concepts conveyed by an educator to students during learning activities [2]. The interactive e-module process uses visual displays in learning activities so that it is easier to use and can be studied independently, then it can also be used as a very interesting learning medium for educators and students [3]. This combination is useful for showing material information in a systematic, interesting and reciprocal relationship. Abstract material can be visualized for students. The advantage of e-modules is that they can be used everywhere, and students can use them more practically at any time.

E-modules are included in the category of teaching materials with a digital platform that prioritizes student independence to carry out learning activities independently. The interactive e-module process uses visual displays in learning activities so that it is easier to use and can be studied independently, then it can also be used as a very interesting learning medium for educators and students [4]. E-modules are one of the teaching materials to improve understanding of theoretical concepts conveyed by an educator to students during learning activities [5]. E-modules are implemented as teaching materials for independent learning resources which have the aim of helping students obtain results from Course Learning Outcomes (CPMK) so that they experience an increase in students' cognitive understanding and understanding. Learning activities on campus become varied and innovative by using teaching materials from more than one learning source. Textbooks are not only the main learning source for students, therefore e-modules are an alternative to enrich students' insight and knowledge.

The Civil and Business Law course is one of the courses that must be taken by students at the Strata 1 (S-1) level of the Pancasila and Citizenship Education Study Program (PPKn) as a requirement to be able to take this course, they must first pass the Introduction to Science course. Law and Introduction to Indonesian Law. In the Decree of the Director General of Higher Education Number 43 of 2006, it discusses the direction of implementation of Personality Development Courses in Higher Education. Students as educators or prospective Pancasila and Citizenship Education (PPKn) teachers are required to not only master knowledge competencies in their field of study or profession. An educator



or prospective teacher is required to be able to solve and solve problems in studying Civil and Business Law courses which do not only emphasize theoretical knowledge or material concepts so that they lack implementation of the concepts of civil and business law themselves. Civil and business law is all the interests and legal rules that regulate legal relationships between one person and another [6]. Concepts related to civil and business law generally regulate private legal relationships, namely providing legal protection to the interests of one person and another or legal entity. Citizen relations are mutually maintained between one person and another citizen as regulated in civil law.

Problem-based e-modules in the Civil and Business Law Course are very important to develop because problems related to civil and business law are directly related to life that occurs in real life in society. A problem in civil and business law is something that must be studied by students in order to be able to solve or solve a problem through the scientific method stage or on a theoretical basis so that students learn the theoretical basis and explore knowledge while honing their problem solving skills.

Problem-based e-modules are a form of teaching strategy that requires students to be active collaboratively when faced with a problem in a real-life situation [7]. Problem-based e-modules expect students to achieve skills not only in memorizing knowledge but teach students to hone their skills in solving problems that occur in life around them. Students can think critically, work together in groups, build good communication and search for and process information. This e-module also links learning media in the form of text and images via devices [8]. The lecturer stated that it was necessary to create an e-module based on civil and business law issues on agreement material because the existing teaching materials had limitations, namely that the existing teaching materials were still limited, there were no case examples and settlement analyzes and there were still printed teaching materials or what are usually called textbooks which are sometimes difficult to obtain. Another aim of this e-module is to increase students' insight regarding case examples and analysis of their solutions.

The author is interested in creating supporting teaching materials in the form of non-printing which contains agreement material that adapts to the demands of a society that is easily changing, a society that thinks creatively and innovatively and a modern society capable of being competitive. The meaning of creative thinking in this case means being able to develop according to the conditions and challenges faced by students. The problems used are real or actually occur in their environment and students are given the opportunity to solve the problems. The problems used in e-modules still adapt to the curriculum framework and learning objectives achieved. Students said that problem-based e-modules are very suitable when used in studying civil and business law because they can make it easier for students to understand a problem. Based on the description that has been presented, this study discusses several problem formulations, namely developing and testing the attractiveness, feasibility and effectiveness of problem-based e-modules with the help of a flipbook maker for contractual legal material.

RESEARCH METHODS

This study uses the writing and development (R&D) method, guided by the steps proposed by Borg and Gall. Development of e-modules based on civil law issues and business agreement material using a procedural model. In this study, we only reached 9 development steps, namely perfecting the final product. The first step taken was data collection with a preliminary study. The second step taken was to formulate the components included in the draft e-module being developed.

The initial trial stage was carried out to determine the level of interest obtained from the results of the student response instrument. The second revision stage was carried out based on the results of suggestions from the initial stage with the aim of making improvements or revisions to the e-module. The field trial stage was carried out through learning activities for 39 students. The final stage is the product refinement stage. This step is to improve or perfect the results of large group trials so that the final product is obtained. This study uses quantitative and qualitative data analysis techniques. The data analysis technique in this study uses criteria in the form of percentages which can be seen in Table 1 below.

TABLE 1. Percentage analysis criteria

No	Percentage	Criteria
1	85 – 100	Very interesting/ very effective/ very worthy, no revision needed
2	70 – 84	interesting/feasible/effective, no need for revision
3	55 – 69	Interesting enough/effective enough/decent enough, no revision needed
4	50 – 54	Less interesting/less effective/less feasible, needs revision
5	< 50	Not interesting/ineffective/not feasible, total revision

RESULT AND DISCUSSION

Initial Problem-Based E-module Product on Contractual Law Material for Students

Learning is a process of reciprocal relationships between individuals and the surrounding environment. Implementation of learning is all forms of action planned to support learning activities in the classroom. A series of actions prepared are useful in supporting the student learning process by considering events directly experienced by students [9]. Learning is a careful arrangement of events with the intention that learning occurs and makes it effective [10]. The process of ongoing interaction or exchanging information (knowledge) between educators and students using planned learning resources and media to produce a change in behavior and certain behaviors.

Learning resources are an important thing that is useful for the student teaching and learning process in the educational environment. Learning resources are said to be the source of all information presented and can become a medium to help students learn based on the curriculum. Learning resources are divided into six types [11], including messages, people, materials, tools, techniques, environment. Learning resources are usually in the form of written information, audio-visuals, technology-based materials, certain objects, events that occur and people who are directly related to helping the learning and learning process. Learning resources are not limited to printed form, but also exist in visual form in software format or a combination of various formats that can be used by students and educators. Current developments show that learning resources are no longer only in non-digital form, but learning resources are increasingly developing on a digital basis that is diverse and varied in presentation. Learning resources are all equipment and tools used by educators to improve the student learning process [12]. The use of learning resources adapts to the learning objectives to be achieved.

Effective learning resources used are learning resources that are able to stimulate students' interest in learning through the senses of sight, hearing and taste. The learning resources used are easily accessible so that they encourage students to achieve the learning goals they want to achieve. Learning resources are anything or resources that can be utilized by educators and students for teaching and learning purposes with the aim of increasing the effectiveness and efficiency of learning objectives. Learning resources include messages, people, materials, tools, techniques, and settings. Learning can be carried out anywhere, at school, at home, at work, in places of worship, and in the wider community.

Learning resources are divided into six types [11] including messages, people, materials, tools, techniques, environment. Messages are a learning resource, formal messages, namely messages issued by official institutions, such as the government or messages delivered according to the learning situation. People is another term for humans who play the role of seeking information, storing information, processing messages and presenting certain information. Material is a certain form that contains a message or information presented using tools or materials as support. This material is often referred to as media or software or software. A tool is a device used to convey messages stored in the material. Technique is defined as a coherent procedure or reference that is prepared to use materials, equipment, people and a learning environment that is integrated and designed to convey teachings or lesson material. The environment, namely the situation around which the teaching and learning process occurs, this environment is divided into two, namely the physical and non-physical environments. Teaching materials are an important part of the implementation of education. Through teaching materials, educators make teaching easier.

Teaching materials are materials or lesson materials that are systematically arranged which are used by teachers and students in the learning process [13]. Teaching materials are a set of materials arranged systematically in written or unwritten form so as to create an environment that fosters students' interest in learning. E-modules can be interpreted as the effectiveness of materials that are useful for building competence and providing assessment in the teaching and learning process [14]. Learning components used by teachers as learning materials for students and assist teachers in carrying out teaching and learning activities in the classroom. Teaching materials are materials or lesson materials that are arranged systematically, which are used by teachers and students in the learning process [15]. Teaching materials are all forms of materials used to help educators convey certain material or information in carrying out teaching and learning activities in the classroom.

Teaching materials are all forms of materials used to assist teachers/instructors in carrying out teaching and learning activities in the classroom. The material in question can be written or unwritten material [16]. A set of material that refers to the curriculum used in order to achieve predetermined competency standards [17]. Learning materials are a set of materials containing learning material or content designed to achieve learning objectives. Based on the opinions of the experts above, it can be concluded that teaching materials are all information that is used as a tool that educators really need to design implementation and can also be used as a learning evaluation tool.

In this writing and development, the product developed is in the form of an e-module as teaching material in the form of electronic media which contains material, methods, objectives of learning and

evaluation activities designed to achieve competencies that are expected to be appropriate, systematic and interesting. E-modules are teaching materials in electronic format that can be used via a computer or smartphone. E-modules can display text, images and videos via electronic devices. E-module is an electronic teaching material whose use process is carried out via electronic devices such as computers, laptops, tablets or even smartphones [18]. E-modules can be used as a learning medium because they have the advantage that they can be accessed anywhere and are supported by videos and images to help understand certain material [19]. E-module to display interesting and interactive teaching materials which are made into an e-book. The process of making this e-book is through the flipbook maker application.

In problem-based learning, students are required to solve problems that are presented by digging up as much information as possible, then analyzing it, and finding a solution. The problem-based e-module is expected to give rise to an independent attitude, accustomed to solving problems and having extensive knowledge. Problem-based learning is relevant to civil law material which can later be used to solve problems. Problem-based learning can encourage students to solve problems that occur in student-centered life [20]. The aim of this problem-based e-module is to grow students' understanding and knowledge, develop thinking and problem-solving skills, and develop independence and self-confidence.

The function of the media when learning activities take place is quite important to improve the quality of the learning process, especially to shape students to learn. Selection of media as an intermediary to assist learning activities [21]. The function of learning media creates effective learning conditions and situations. This e-module contains teaching materials that contain illustration displays presented in augmented reality (AR) so that illustration displays related to contractual legal material can be included in barcodes. If the barcode is scanned using the special application provided, a 3-dimensional image will appear. This image will increase students' interest in learning independently because in the world of education it is still rarely used.

Students can read by feeling the learning process. It's not boring to watch because the electronic module is based on civil law issues and business agreement material. This learning activity is like opening a book as if it were real because there is an animation effect where when you move pages it will look like you are opening the book directly. By using these learning media. It is hoped that it can provide renewal in the learning process in the classroom. Using flipbook maker media can increase students' interest in learning and can also influence student achievement or learning outcomes.

The e-module is accompanied by the presentation of problems related to civil matters that are close to student life with a combination of barcodes. In the case example regarding the material of the agreement and its settlement from the Court Decision taken from the Supreme Court website. Examples of cases are problem-based which link learning material to problems related to civil issues that occur in local life. Problem-based learning first coined by Barrows and Tamblyn in 1980 then at the end of the 20th century it was developed by Wina Sanjaya in 2007. The agreement material and its settlement are included in the barcode. If the barcode is scanned using the special application provided, it will appear. This aims to make students interested in learning independently and easy for students to remember.

In problem-based learning, students are required to solve problems that are presented by digging up as much information as possible about examples of cases related to contractual legal material, then analyzing them and finding solutions. Problem-based learning is expected to give birth to an independent attitude, accustomed to solving problems and having extensive knowledge. This learning is relevant to civil law material which can later be used to solve problems in life.

The characteristics of problem-based learning use problems or events that occur in life. Lecture activities are focused on problem solving. Educators act as intermediaries or facilitators. Problem-based learning can help students develop the ability to think and solve problems by involving experience or knowledge in life.

Problem-Based E-module Trial Data on Contractual Law Material for Students

The trial of the civil and business law e-module based on agreement material issues for students of the Pancasila and Citizenship Education Undergraduate Study Program at the State University of Malang was carried out after obtaining valid results from the trial that had been carried out by media experts, material experts and learning experts. Small group trials were carried out by 8 students. Next, improvements were made to suggestions or input from the results of the small group test evaluation, then a large group test was carried out involving 39 subjects from the Pancasila and Citizenship Education Undergraduate Study Program, State University of Malang. Data from large group tests on the effectiveness of using civil and business law e-modules based on agreement material in the learning process.

Validation Results of Media Experts, Learning Experts and Material Experts

The validation results from media experts, material experts and learning experts in this study were then analyzed. Data analysis is a process carried out after the data is obtained, then the data is processed which will later be processed into information aimed at explaining the results of the data from the trials that have been carried out. In the data analysis section at the end there are conclusions from the test results listed. The following presentation in the data analysis section is used as a basis for improving the product in the form of an e-module. Validation data from media experts, material experts and learning experts in this study was obtained from the results of instruments that had been given to media experts, material experts, learning experts, instruments resulting from large group trial responses of 39 students from the Pancasila and Citizenship Education Undergraduate Study Program at State University. Poor.

Based on comments and suggestions obtained from learning experts, namely lecturers in the Law and Citizenship Department, input was obtained relating to aspects of observing the e-module based on legal issues in the Civil and Business Law courses, the material on contract law, namely the cover on the e-module cover page still uses Criminal Justice abroad should not use the words Holy Bible on the cover page because this is the Criminal Justice Code used abroad, then the material presented is less in-depth, and it is recommended to add examples of whether an agreement is valid or not and its analysis.

Based on the suggestion data from the media expert's evaluation which is an aspect of observation of the e-module based on contractual legal material issues, according to the media expert's evaluation, suggestions or input were obtained, namely that the source of each image contained in the e-module should be added, in addition to making it easier for readers to find out the source of the illustration or image. where it comes from, for example taking it from the internet or making it yourself which can be said to be a personal collection, so that in the future there will be no problems regarding copyright of images or illustrations contained in the e-module.

Based on the comments and suggestions obtained through the validation instrument from civil and business legal material experts, input related to the e-module was obtained according to the learning expert's evaluation, namely systematics in the e-module based on civil and business legal issues, agreement legal material, it would be better if using the first systematic terms regarding agreements, then continued with special agreements in book III of the Civil Code, and ends with the sub-material of force majeure.

The next data presentation is the results of the effectiveness test assessment e-module. The assessment of this effectiveness test is seen from the aspect of the function of teaching materials and learning resources, such as increasing students' interest in learning. Students become critical thinkers because there are examples of civil law cases related to local life. E-module based on contractual legal material issues helps students learn and understand the concepts of the material.

The results of the effectiveness test assessment were categorized as effective as teaching materials and learning resources. Effectiveness test assessments are obtained through pre-tests and post-tests to compare student learning outcomes. In the data section, the results of the large group test assessment to test the effectiveness of the e-module were obtained by the author through pre-tests and post-tests to measure student learning outcomes. This effectiveness test was carried out in a large group test, namely 39 undergraduate students of Pancasila and Citizenship Education on barcode-assisted e-modules, getting an average score before a pre-test was held, students got an average score of 57.85, then after a post-test was held. obtained an average score of 72.05. The analysis in this study then converted the final score into a percentage value to obtain significant results so that it could be categorized as follows Civil and business law e-module based on contractual legal material issues interesting and effective.

TABLE 2. Results Of Pre-Test And Post-Test Normality Tests

		<i>Unstandardized Residuals</i>
<i>N</i>		39
<i>Normal Parameters, b</i>	<i>Mean</i>	.0000000
	<i>Std. Deviation</i>	3.33944440
<i>Most Extreme Differences</i>	<i>Absolute</i>	,195
	<i>Positive</i>	,195
	<i>negative</i>	-.156
<i>Statistical Tests</i>		,195
<i>Asymp. Sig. (2-tailed)</i>		.001c
<i>Monte Carlo Sig. (2-tailed) Sig.</i>		.093d
<i>99% Confidence Interval</i>		
<i>Lower Bound</i>		,085
<i>Upper Bound</i>		,100

In this study, the Kolmogorov Smirnov normality test was carried out, which is a test to find out that the data distributed by the author is normal or not. If the application is carried out in the Kolmogorov Smirnov test, if the significance is below 0.05, it means that the data to be tested shows a significant increase in the level of normal data, meaning the data is not normal. The following data on the results of the pre-test and post-test normality tests are listed in Table 2.

Based on Table 2, the results of the normality test analysis are listed. The normality test is used to determine whether the data that has been collected is normally distributed or not. The normality test was carried out on the data from the pretest and posttest results of each variable after they were known. Normality testing in this study uses statistical software. Determining the normality of data is that if the significance level is >0.05 then it is declared a normal distribution and conversely if the significance level is <0.05 then the data is considered not normal. The following are the results of the normality test, namely significant 0.93, which means that the significance level is >0.05 , so the normality test results are said to be normal.

The following Table 3 contains the average score before the pre-test was carried out and after the post-test was carried out, the results were obtained average score before the pre-test and after the post-test. The paired sample t-test formula is one of the testing methods used to assess the effectiveness of treatment, characterized by differences in the average before and the average after treatment is given. This paired sample t-test is used to analyze the writing model carried out before and after. The following is Table 3 of the calculated results of the paired sample t-test.

TABLE 3. Paired Sample T-Test Results

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre-test	57.82	39	6,958	1,114
	post-test	72.05	39	3,387	,542

Based on the Table 3, test effectiveness. In this study, the t test above shows that the average score before the pre-test was 57.82, then after learning activities using the e-module that had been developed, the average post-test score was 72.05, so the e-Modules based on civil law issues and business agreement material obtained effective results based on the student pre-test and post-test assessment scores showing an increase or improvement from the score range of 55-100. Test Paired sample t-test is one of the testing methods used to measure the level of effectiveness. This study uses calculations paired sample t-test formula using statistical software. The following is Table 4 of the paired sample t test results.

TABLE 4. Paired Sample T-Test Results

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre-test	57.82	39	6,958	1,114
	post-test	72.05	39	3,387	,542

Based on Table 4, data analysis to measure the level of effectiveness uses the t-test hypothesis test using the paired sample t test formula. This test takes into account the students' pre-test and post-test scores using statistical software. The table above shows the results that the significant value is less than 0.05 so it is categorized as effective. There was an increase in the average score before and the average after using learning activities. The e-module based on civil law issues and business agreement material resulted in an increase in students' abilities and knowledge. This is proven by the positive implications, namely an increase or improvement in students' grades after learning using the e-module.

After validation results were carried out by media experts, material experts and learning experts, the scores from the feasibility test were converted and showed a final score in the very suitable for use category. The results of the next assessment are the assessment of the effectiveness test-e-module. This test assessment is seen from the aspect of the function of teaching materials and learning resources, such as increasing students' interest in learning, students becoming critical thinkers because it contains examples of cases of civil law problems related to life around them. Civil and business law e-module based on contractual legal material issues help students learn the material. The results of the effectiveness test assessment were categorized as effective, appropriate and interesting as teaching materials and learning resources that are effectively used.

CONCLUSION

E-modules are teaching materials in electronic format that are used via computer or smartphone. E-modules can display text, images, etc video via electronic devices. E-modules can be used as media

learning because it has the advantage that it can be accessed anywhere it is supported with a video and images to help understand a particular material. preparing e-modules makes it easier for students to study independently without or with the guidance of an educator, the e-module must contain learning instructions and achievements competency, material content, supporting information, practice questions, individual worksheets and groups, answer keys and evaluations which are summarized systematically. The effectiveness test gets the effective category as teaching materials and resources Study. In the data section, the results of the effectiveness test assessment were obtained by researchers through tests pre-test and post-test to measure student learning outcomes. It is based on The average score previously held by students was a pre-test with the results, namely: 57.85, then after holding the post-test the average score was obtained, namely 72.05. This shows that there is an increase in student learning outcomes, namely scores The average obtained by students was 14.23. Results of the t test carried out got a significance value of $0.000 < 0.05$, this means that there is a difference significant between the pre-test and post-test results. The conclusion is that the use of problem-based e-modules in the Civil Law and Business Legal Subjects is legal material agreement assisted by flipbook maker, barcode, and augmented reality (AR) on Teaching and learning activities have the effect of improving learning outcomes student. There are also two aspects to assessing convenience, namely content and language. The content aspect consists of systematics, clarity of the content of the teaching materials studied, while linguistic aspects are assessed from the clarity of language use and guide on how to use it listed in the civil and business law e-module based on contractual legal material issues

REFERENCES

- [1] Munir, *Pembelajaran Jarak Jauh Berbasis Teknologi Informasi Dan Kominukasi*. Bandung, Indonesia: Alfabeta, 2009.
- [2] A. Gunadharma, *Pengembangan Modul Elektronika Sebagai Sumber Belajar Untuk Mata Kuliah Multimedia Design*, Skripsi, Universitas Negeri Jakarta, Jakarta, Indonesia, 2011.
- [3] Yogyakarta State University, "Web-Based Academic Information System," 2010.
- [4] D. Gunawan, "Modul Pembelajaran Interaktif Elektronika Dasar Untuk Program Keahlian Teknik Audio Video SMK Muhammadiyah 1 Sukoharjo Menggunakan Macromedia Flash 8," *KomuniTi*, vol. 2, no. 1, pp. 60-66, 2010.
- [5] S. Wahyuni, S. Supeno, and R. E. Salsabila, "Pengembangan Modul Elektronik Fisika Sebagai Media Instruksional Pokok Bahasan Hukum Newton Pada Pembelajaran Fisika di Sma," *Jurnal Pembelajaran Fisika*, vol. 1, no. 4, pp. 411-416, 2013, doi: [10.19184/jpf.v1i4.23194](https://doi.org/10.19184/jpf.v1i4.23194).
- [6] R. Subekti, *Pokok-Pokok Hukum Perdata*. Jakarta, Indonesia: Intermasa, 2003.
- [7] N. R. Aini et al., "Problem-Based Learning for Critical Thinking Skills in Mathematics," *IOP Conf. Series: J. Phys.: Conf. Ser.*, vol. 1155, pp. 1-7, 2018. doi:[10.1088/1742-6596/1155/1/012026](https://doi.org/10.1088/1742-6596/1155/1/012026)
- [8] K. R. Winatha, N. Suharsono, and K. Agustini, "Pengembangan E-modul Interaktif Berbasis Proyek Mata Pelajaran Simulasi Digital," *JPTK*, vol. 15, no. 2, pp. 188-199, 2018. doi: [10.23887/jptk-undiksha.v15i2.14021](https://doi.org/10.23887/jptk-undiksha.v15i2.14021)
- [9] W. S. Winkel, *Psikologi Pembelajaran: Penerapan Psikologi dalam Pendidikan*. Jakarta, Indonesia: Gramedia Widiasarana Indonesia, 1996.
- [10] R. M. Gagne, *The Conditions of Learning and Theory of Instruction*, 4th ed. New York, NY, USA: CBS College Publishing, 1985.
- [11] Daryanto, *Instructional Media*. Yogyakarta, Indonesia: Gava Media, 2016.
- [12] D. Elliot, D. Wilson, and S. Boyle, "Science learning via multimedia portal resources: The Scottish case," *British Journal of Educational Technology*, vol. 45, no. 4, pp. 571-580, 2014, doi: [10.1111/bjet.12085](https://doi.org/10.1111/bjet.12085).
- [13] P. Harvest, *Constructivism in Learning*. Jakarta, Indonesia: Ministry of National Education, 2001.
- [14] F. K. Aisyi, S. Elvyanti, T. Gunawan, and E. Mulyana, "Pengembangan Bahan Ajar Tik Smp Mengacu Pada Pembelajaran Berbasis Proyek," *Innovation of Vocational Technology Education*, vol. 9, no. 2, 2013. doi: [10.17509/invotec.v9i2.4861](https://doi.org/10.17509/invotec.v9i2.4861)
- [15] A. Prastowo, *Creative Guide to Creating Innovative Teaching Materials*. Yogyakarta, Indonesia: Diva Press, 2015.
- [16] L. K. Ahmadi and A. Sofan, *School Learning Strategies with International and National Standards*. Jakarta, Indonesia: Library Achievement, 2010.
- [17] I. Lestari, *Pengembangan Bahan Ajar Berbasis Kompetensi (Sesuai dengan Kurikulum Tingkat Satuan Pendidikan)*. Padang, Indonesia: Akademia Permata, 2013.
- [18] S. Wahyuni, "Development of science teaching materials to improve junior high school students' critical thinking skills," *Proceedings: National Seminar on Physics and Physics Education*, vol. 6, 2015.

- [19] I. M. Suarsana, "Development of problem-solving oriented e-modules to improve students' critical thinking skills," *JPI (Indonesian Education Journal)*, vol. 2, no. 2, 2013.
- [20] S. D. Aji and M. N. Hudha, "Kerja Ilmiah Siswa Smpdan Sma Melalui Authentic Problem Based Learning (APBL)," *Journal of Educational Inspiration*, vol. 6, no. 1, pp. 835-841, 2016, doi: [10.21067/jip.v6i1.1089](https://doi.org/10.21067/jip.v6i1.1089).
- [21] Rusman, *Integrated Thematic Learning Theory, Practice and Assessment*. Jakarta, Indonesia: Rajawali Press, 2015.