Jurnal Pendidikan Dasar Nusantara Vol 11, No 1, July 2025
ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

Development of Problem-Based Interactive E-Modules to Improve Learning Outcomes of Grade V Students at SDN 1 Brondong

Submitted:
May 24, 2025
Accepted:
July 15, 2025
Published:
July 31, 2025

Jenita Herga Putri Apsari[1], Ina Agustin[2]
jenita.herga@gmail.com[1], Inaagustin88@gmail.com[2]
PGSD, FKIP, Universitas PGRI Ronggolawe Tuban

Abstract: This study aims to develop and test the feasibility of a problem-based interactive E-Module in improving the learning outcomes of fifth-grade students in the Science subject at SDN 1 Brondong. The background to this research is the lack of student learning outcomes and the limitations of the learning media used by teachers. The approach used is the R&D (Research and Development) method that applies the ADDIE development model, which includes the stages of analyzing problems and needs, product design, product development, product implementation in elementary schools, and finally evaluation. The validation results indicate that the E-Module is considered very feasible with a score of 82% each by material and media experts, and 86% by language experts. The practicality of the media received a very positive response from teachers (96%) and students (96.8%). The effectiveness of the media is proven by an increase in learning scores with a mean N-Gain value of 0.77 or 77%, which is considered high. This electronic module is also accompanied by learning videos and problems, interactive quizzes, which are designed to encourage students to think critically and actively in learning. Based on these findings, the interactive problem-based E-Module is considered very valid, practical, and effective for use as an alternative teaching and learning media to increase the activeness and learning outcomes of students at SDN 1 Brondong.

Keywords: Media development, Interactive e-modules, Problem-based learning, Learning outcomes

PRELIMINARY

Education is a planned and conscious process designed to develop individual potential in various aspects of life, including cognitive, emotional, and social development. According to Hidayat and Abdillah (2019:24), education is a conscious and planned effort to guide students. In the world of education, changes continuously occur along with the times, especially with the advent of increasingly advanced technology. Technological advances can make it easier for students and educators to access learning resources (Azkiya et al., n.d.). Technology not only changes the way teaching materials are delivered but also introduces new, more flexible and interactive learning methods.

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

The significant expansion of Information and Communication Technology (ICT) has had a significant impact on the world of education. Furthermore, technology also allows students to learn material from other sources, enabling them to have a more comprehensive interpretation of the topics being studied (Fricticarani et al., 2023). The integration of technology into active learning can increase student engagement and interaction, thereby streamlining learning procedures and achieving better educational goals (Depita, 2024).

Science (IPAS) is a subject that combines science and social studies concepts to provide students with a broad understanding of natural and social phenomena. This subject aims to develop students' critical and analytical thinking skills and heighten their awareness of relevant environmental and social issues (Nuryani et al., 2023). Science learning provides students with opportunities to explore and understand the interactions between the natural and social environments, enabling them to develop critical and creative attitudes (Wijayanti & Ekantini, 2023). Learning outcomes are related to learning activities because they comprise all psychological domains and are the result or consequence of students' experiences and classroom learning processes (Nabillah & Abadi, 2019). According to Asriyanti & Janah (2018), learning outcomes play a crucial role in the overall learning process because they provide educators with details about students' progress in achieving learning objectives through subsequent teaching activities.

Based on the data from the results of observations of learning activities and interviews with grade V teachers, the results obtained include: (1) the teaching materials applied by teachers are only sourced from LKS books and textbooks, (2) teachers only apply direct learning models and focus on teachers which results in students being less active in teaching and learning activities, (3) teachers tend not to use diverse teaching media and are less interactive so that students are less enthusiastic in learning, (4) during the teaching and learning process students lack concentration, (5) students often do not bring textbooks according to the schedule (6) the daily social studies test scores of grade V students are still low, namely <50% of students who get scores above the KKTP. In addition, researchers also conducted a pre-test on the material CHAPTER 8 My Dear Earth, My Malang, which showed that out of a total of 20 students in grade V, only 7 students got results exceeding the KKTP with a percentage of 35%. Based on the problem of low learning achievement of grade V students in the subject of social studies, to

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

improve this situation, learning media are needed that can attract attention and encourage student activity in learning activities. Learning media are tools that teachers can use to present lessons so that students are engaged with what is being taught (A. P. Wulandari et al., 2023). Among the media that can be utilized are interactive electronic modules (F. Wulandari et al., 2021).

E-Modules (Electronic Modules) are digital learning materials designed to facilitate learning by utilizing ICT, encouraging students to be independent in the learning process and improving their academic performance (Laraphaty et al., 2021). Interactive e-Modules not only contain learning materials but also systematically structured learning and evaluation methods, complemented by various multimedia elements, such as text, illustrations, sound, video, and animation, to enhance student understanding and motivation (Nopiani et al., 2021). According to Belanisa et al., 2022, the use of interactive e-Modules can improve the quality of the learning process, making learning more innovative, attractive, and flexible.

The choice of learning model also influences student learning outcomes, in addition to teaching materials (Pramana et al., 2020). Problem-based learning is a learning model that places students in real-life problem situations and serves as a stimulus at the beginning of the lesson, thereby encouraging students to be motivated and work diligently to solve existing problems (Ardianti et al., 2021). According to (Mayasari et al., 2022), PBL is a learning approach that emphasizes active student participation, where students use their everyday experiences to solve problems. This problem-based learning model can result in students being more enthusiastic and independent in learning because they are faced with real-life problems that encourage them to think critically and collaborate in finding solutions through the five syntaxes of problem-based learning (PBL).

Based on the findings from the observations, researchers have designed and developed a media in the form of a Problem-Based Interactive E-Module to improve the learning outcomes of fifth-grade students at SDN 1 Brondong. This e-module includes interactive quizzes, instructional videos, and problem-based videos that encourage critical thinking and student engagement in the learning and teaching process, as well as evaluation questions in the form of GForms. This study aims to describe the validity, effectiveness, and practicality of the developed interactive, problem-based e-module media.

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

METHOD

This study employs a research approach of the R&D (Research and Development) type. Sugiyono (in Mustafa & Angga, 2022) states that R&D is a research method aimed at developing a specific product while assessing its effectiveness and efficiency. The researchers used the ADDIE model with five research stages: *Analyze, Design, Development, Evaluation*, dan *Implementation*.

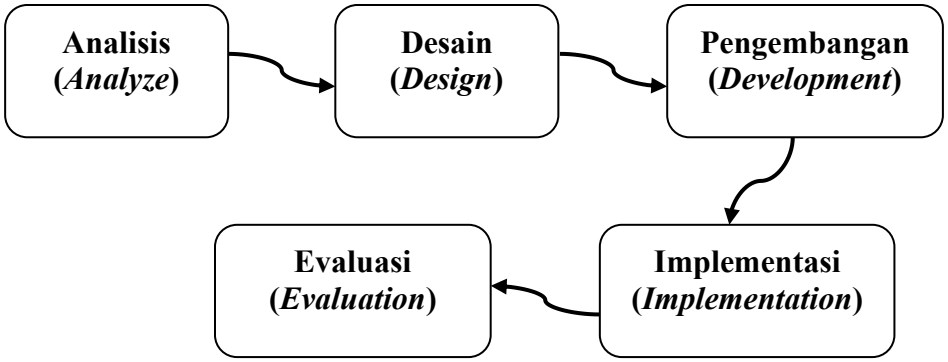

Figure 1. Stages of the ADDIE Model Source: (Sa'idah et al., 2024)

The following are the stages of the development model that the researcher carried out based on the ADDIE model, namely: (1) Analysis (Analyze), in this initial stage the researcher analyzed all student needs through observations of fifth grade learning activities in the subject of science as well as interviews with fifth grade teachers at SDN 1 Brondong by analyzing the needs of students and teachers, the curriculum used, and student characteristics. (2) Design (Design), is the design process carried out in making Problem-Based Interactive E-Modules including collecting materials, compiling materials according to TP, and making E-Modul designs in line with the needs of students in elementary schools. (3) Development (Development), in this stage the realization of product creation activities is carried out based on the planned design as well as validation from experts, namely material experts, media experts, and language experts to obtain data regarding the level of validity and feasibility of the media. (4) Implementation (Implementation), in this stage a direct trial was carried out on 20 fifth grade students and teachers at SDN 1 Brondong to determine the level of effectiveness and practicality of the media. (5) Evaluation: This stage is to determine whether the problem-based interactive e-module media is valid and suitable for use.

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

This research used expert validation sheets, teacher and student questionnaires, and both quantitative and qualitative research data. Quantitative data were collected based on assessments conducted by validators to determine the media's validity, student test results to determine the media's effectiveness, and student and teacher questionnaire responses to determine the media's practicality. Qualitative data were collected based on input and suggestions for improvement written by validator experts. The effectiveness of the problem-based interactive e-module media was calculated using the N-Gain formula, while validity and practicality data were calculated using the following formula:

$$\text{Presentase} = \frac{\text{Total score obtained (n)}}{\text{Maximum score (N)}} \text{ x } 100\%$$

Sugiyono in (Puteri, 2022)

RESULTS

A. Validity Data

The following data is the result of the expert validation assessment..

Table 1. Validation Assessment Results

No.	Validator	Presentase	Criteria
1.	Expert or Media Specialist	82%	Very Valid
2.	Expert or Material Expert	82%	Very Valid
3.	Expert or Language Specialist	86%	Very Valid

Based on Table 1, validation data was obtained with a percentage value of 82% from media experts or specialists, 82% by material experts or specialists, and 86% from language experts, this indicates that the Problem-based Interactive E-Module media has very suitable and valid criteria for use in learning activities with minimal revision.

B. Practical Data

Table 2. Results of Teacher and Student Responses

No.	Questionnaire	Presentase	Criteria
1.	Teacher Responses	96%	Very Practical
2.	Student Responses	96,8%	Very Practical

Based on Table 2, the percentage of scores obtained from the teacher response questionnaire was 96%, while the percentage from the student response questionnaire reached 96.8%. Both values indicate that the Problem-Based Interactive E-Module media falls into the very practical classification.

Jurnal Pendidikan Dasar Nusantara Vol 11, No 1, July 2025
ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

C. Effectiveness Data

Table 3. Effectiveness Test Results

No.	Learners	Pretest Score	Posttest Score	N-Gain	N-Gain (%)
1.	AKFS	80	95	0,75	75%
2.	ADS	80	90	0,50	50%

Continued Table 3. Results of Effectiveness Test

No.	Peserta Didik	Pretest Score	Posttest Score	N-Gain	N-Gain (%)
3.	AAMA	40	85	0,75	75%
4.	AAR	40	80	0,67	67%
5.	BWS	75	100	1,00	100%
6.	DNK	50	85	0,70	70%
7.	DSMP	75	95	0,80	80%
8.	FRU	45	80	0,64	64%
9.	FHR	75	90	0,60	60%
10.	FNO	90	100	1,00	100%
11.	JCM	40	90	0,83	83%
12.	MAAS	45	90	0,82	82%
13.	MCD	50	85	0,70	70%
14.	NNM	75	95	0,80	80%
15.	NAN	40	95	0,92	92%
16.	NKW	60	80	0,50	50%
17.	NCT	50	90	0,80	80%
18.	SNH	40	95	0,92	92%
19.	SS	40	95	0,92	92%
20.	YDD	50	90	0,80	80%
	Average Number	**57,00**	**90,25**	**0,77**	**77%**
	N-Gain Criteria				High
	N-Gain Criteria (%)				Effective

Based on Table 3, the results of student learning achievements were recorded with a final N-Gain score of 0.77 with a percentage of 77%, which shows that the E-Module media has a high or effective category in improving the learning outcomes of class V students.

Qualitative Data

In this study, qualitative data is in the form of notes and suggestions from validators which can be used as material for improvements in the development of interactive problem-based E-Module media.

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

Table 4. Notes from Subject Matter Expert Validators

No.	Validator note	Researcher follow-up
1.	Image is too small and source is not listed.	Enlarging the image and adding sources

Continued Table 4. Material Expert Validator Notes

No.	Validator's Notes	Researcher Follow-up
2.	The questions used are still C1-C3	Improving the questions
3.	Learning objectives do not hone thinking skills	Improving the learning objectives
4.	Bibliography needs attention	Improving the bibliography format
5.	Glossary layout needs improvement	Improving the glossary format

Based on Table 4, the expert material validator's notes and the researcher's follow-up in the form of revisions and improvements to the interactive problem-based E-Module media are shown according to the notes provided by the validator.

Table 5. Media Expert Validator Notes

No.	Validator notes	Researcher follow-up
1.	The media is good, please use it.	

Based on Table 5, the expert material validator's notes and the researcher's follow-up in the form of revisions and improvements to the interactive problem-based E-Module media are shown according to the notes provided by the validator.

Table 6. Language Expert Validator Notes

No.	Validator's Notes	Researcher follow-up
1.	Spelling Techniques	Improving writing
2.	Standardization of Foreign Languages into Indonesian	
3.	Language Absorption Distinguishes from Standard Words	

Based on Table 6, the expert material validator's notes and the researcher's follow-up in the form of revisions and improvements to the interactive problem-based E-Module media are shown according to the notes provided by the validator.

DISCUSSION

E-Modul E-modules are effective teaching materials or resources to support teaching and learning activities (Darmayasa et al., 2018). E-modules empower students to learn independently and allow them to assess their own level of understanding. They also provide an end goal for learning activities, providing students with an understanding of what they need to understand or master to achieve learning objectives (Lastri, 2023).

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

Research findings demonstrate that the developed Problem-Based Interactive E-Module has proven to have high levels of validity, practicality, and effectiveness. Validation by three experts was deemed highly valid, with scores of 82% from media experts, 82% from content experts, and 86% from language experts. These findings indicate that the content of the E-Module aligns with the curriculum, is easy for students to understand, is structured in communicative language, and is appropriate for students' cognitive development.

In terms of practicality, both teachers and students responded very positively, with scores of 96% and 96.8%, respectively. This figure indicates that the e-Module is easy to use, engaging, and supports a fun and interactive learning process. Furthermore, this practicality is further enhanced by its engaging visuals, interactive quizzes, and the integration of instructional videos and problem-based videos that stimulate active student participation. In terms of practicality, teacher and student responses regarding the use of the Problem-Based Interactive E-Module indicate that it is highly practical. The questionnaire results showed a practicality score of 96% from teachers and 96.8% from students. This achievement reflects that the e-Module is easy to use in learning activities, visually appealing, and can increase active student engagement. Elements such as engaging visuals, instructional videos, problem-based videos, and interactive quizzes have been proven to support a more dynamic learning environment and stimulate active student participation.

Furthermore, the effectiveness test results showed an increase in student learning outcomes from pretest to posttest, with an average N-Gain of 0.77, with 77% achieving a high percentage. This indicates that the interactive problem-based e-module is effective in supporting students' understanding of the material while developing their critical and analytical thinking skills. The video problem-solving feature also contributes to students' ability to identify and solve problems, in line with the problem-based learning (PBL) approach implemented in the module.

In addition to quantitative data, qualitative findings from input from validators also contributed significantly to the media's refinement. Suggestions such as image enlargement, spelling corrections, and question adjustments have been optimally addressed by the researchers, resulting in an overall improvement in the e-module's quality. Therefore, this interactive problem-based e-module is not only suitable for use in

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

the learning process but is also practical and effective in supporting the learning outcomes of fifth-grade students in science at the elementary school level.

CONCLUSION

According to research results, the development of the Problem-Based Interactive E-Module was confirmed to be highly valid, practical, and effective in supporting the improvement of fifth-grade students' learning outcomes in science. The module's validity was supported by expert assessments, with scores of 82% from material experts, 82% from media experts, and 86% from language experts. The media's practicality also received very positive responses from both teachers and students, at 96% and 96.8%, respectively, indicating that the media is highly practical and reflects its ease of use in learning. Furthermore, the media's effectiveness was demonstrated by the improvement in student learning outcomes, with a mean N-Gain score of 0.77, representing 77% of the students. This high-performance module indicates that it is effective as a teaching resource. This e-Module is considered to support more active and engaging teaching and learning activities, both in terms of visualization and language use, which are appropriate for the cognitive abilities of elementary school students. With these characteristics, the Problem-based Interactive E-Module can be an effective alternative learning media in improving student learning outcomes, especially in the fifth grade science subject at SDN 1 Brondong.

REFERENCES

Ardianti, R., Sujarwanto, E., & Surahman, E. 2021. Problem-based Learning: Apa dan Bagaimana. *Diffraction : Journal for Physics Education and Applied Physics*, *3*(1), 27–35. https://doi.org/10.37058/diffraction.v3i1.4416

Asriyanti, F. D., & Janah, L. A. 2018. Analisis Gaya Belajar Ditinjau Dari Hasil Belajar Siswa. *Ilmu Pendidikan: Jurnal Kajian Teori dan Praktik Kependidikan*, *3*.

Azkiya, H., Tamrin, M., & Yuza, A. 2022. Pengembangan *E-Modul* Berbasis Nilai-Nilai Pendidikan Multikultural di Sekolah Dasar Islam. *Jurnal Pendidikan Agama Islam Al-Thariqah*.

Belanisa, F., Amir, F. R., & Sudjani, D. H. 2022. *E-Modul* Interaktif Sebagai Media Pembelajaran Bahasa Arab Untuk Meningkatkan Motivasi Siswa. *Tatsqifiy: Jurnal Pendidikan Bahasa Arab*, *3*(1), 1–12. https://doi.org/10.30997/tjpba.v3i1.4754

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

Darmayasa, I. K., Jampel, I. N., & Simamora, A. H. 2018. Pengembangan *E-Modul* Ipa Berorientasi Pendidikan Karakter Di SMP Negeri 1 Singaraja. *Jurnal Edutech Undiksha*.

Depita, T. 2024. Pemanfaatan Teknologi Dalam Pembelajaran Aktif (Active Learning) Untuk Meningkatkan Interaksi dan Keterlibatan Siswa. *Tarqiyatuna: Jurnal Pendidikan Agama Islam dan Madrasah Ibtidaiyah*, *3*(1), 55–64. https://doi.org/10.36769/tarqiyatuna.v3i1.516

Fricticarani, A., Hayati, A., Ramdani, Hoirunisa, I., & Rosdalina, G. M. 2023. Strategi Pendidikan Untuk Sukses Di Era Teknologi 5.0. *Jurnal Inovasi Pendidikan dan Teknologi Informasi (JIPTI)*, *4*(1), 56–68. https://doi.org/10.52060/pti.v4i1.1173

Hidayat, R., & Abdillah. 2019. *Ilmu Pendidikan Konsep, Teori, dan Aplikasinya*. Lembaga Peduli Pengembangan Pendidikan Indonesia (LPPPI).Medan.

Laraphaty, N. F. R., Riswanda, J., Anggun, D. P., Maretha, D. E., & Ulfa, K. 2021. Review: Pengembangan Media Pembelajaran Modul Elektronik (*E-Modul*). *Prosiding Seminar Nasional Pendidikan Biologi 2021*. Universitas Islam Negeri Raden Fatah Palembang.

Lastri, Y. 2023. Pengembangan Dan Pemanfaatan Bahan Ajar *E-Modul* Dalam Proses Pembelajaran. *Jurnal Citra Pendidikan*, *3*(3), 1139–1146. https://doi.org/10.38048/jcp.v3i3.1914

Mayasari, A., Arifudin, O., & Juliawati, E. 2022. Implementasi Model Problem Based Learning (PBL) Dalam Meningkatkan Keaktifan Pembelajaran. *Jurnal Tahsinia*, *3*(2), 167–175. https://doi.org/10.57171/jt.v3i2.335

Mustafa, P. S., & Angga, P. D. 2022. Strategi Pengembangan Produk dalam Penelitian dan Pengembangan pada Pendidikan Jasmani. *Jurnal Pendidikan : Riset dan Konseptual*, *6*(3), 413. https://doi.org/10.28926/riset_konseptual.v6i3.522

Nabillah, T., & Abadi, A. P. 2019. Faktor Penyebab Rendahnya Hasil Belajar Siswa. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika 2019*. Universitas Singaperbangsa Karawang.

Nopiani, R., Suarjana, I. M., & Sumantri, M. 2021. *E-Modul* Interaktif Pada Pembelajaran Tematik Tema 6 Subtema 2 Hebatnya Cita-citaku. *MIMBAR PGSD Undiksha*, *9*(2), 276. https://doi.org/10.23887/jjpgsd.v9i2.36058

Nuryani, S., Maula, L. H., & Nurmeta, I. K. 2023. Implementasi Kurikulum Merdeka dalam Pembelajaran IPAS di Sekolah Dasar. *Jurnal Pendidikan Dasar Flobamorata*, *4*(2), 599–603. https://doi.org/10.51494/jpdf.v4i2.952

Pramana, M. W. A., Jampel, I. N., & Pudjawan, K. 2020. Meningkatkan Hasil Belajar Biologi Melalui *E-Modul* Berbasis Problem Based Learning. *Jurnal Edutech Undiksha*, *8*(2), 17. https://doi.org/10.23887/jeu.v8i2.28921

Puteri, L. A. S. (2022). Pengembangan Spinning Wheel Sebagai Media Pembelajaran Siswa Materi Perubahan Lingkungan Kelas V Sekolah Dasar. *Jurnal Pendidikan Guru Sekolah Dasar*, *10*.

ISSN 2579-6461 (Online) ISSN 2460-6324 (Print)
DOI: https://doi.org/10.29407/jpdn.v11i1.25388

Sa'idah, N. U., Handoyo, E., Supriyadi, Dirwanto, & Akanto, B. 2024. Pengembangan *E-Modul* Berbasis Problem Based Learning Terintegrasi Wordwall Untuk Meningkatkan Kemampuan Kognitif Siswa. *ELSE (Elementary School Education Journal): Jurnal Pendidikan dan Pembelajaran Sekolah Dasar*, *8*(2). https://doi.org/10.30651/else.v8i2.20967

Wijayanti, I. D., & Ekantini, A. 2023. Implementasi Kurikulum Merdeka Pada Pembelajaran IPAS MI/SD. *September 2023*, *08 Nomor 02*, 2100–2112.

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, *5*(2), 3928–3936. https://doi.org/10.31004/joe.v5i2.1074

Wulandari, F., Yogica, R., & Darussyamsu, R. 2021. Analisis Manfaat Penggunaan *E-Modul* Interaktif Sebagai Media Pembelajaran Jarak Jauh Di Masa Pandemi Covid-19. *Khazanah Pendidikan*, *15*(2), 139. https://doi.org/10.30595/jkp.v15i2.10809