



## Literature Study of E-Modules Based on Project-Based Learning to Improve Critical Thinking Skills of Students

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**Abstract:** This article aims to see how e-modules designed with the Project Based Learning (PjBL) approach can improve students' critical thinking skills. The method used is a literature review analyzing 25 relevant articles published between 2018 and 2025. This study's findings indicate that applying the Project Based Learning (PjBL) model in e-modules significantly impacts students' critical thinking skills. The project-based learning model provides opportunities for students to actively participate in solving complex problems, thus encouraging them to think critically and deeply in evaluating information. This result confirms that applying PjBL in e-modules is essential to equip students to face the challenges in the 21st century.

**Abstrak:** Artikel ini bertujuan untuk melihat bagaimana e-modul yang dirancang dengan pendekatan *Project Based Learning* (PjBL) dapat meningkatkan kemampuan berpikir kritis siswa. Metode yang digunakan adalah kajian pustaka dengan menganalisis 25 artikel yang relevan yang dipublikasikan antara tahun 2018 hingga 2025. Hasil temuan penelitian ini menunjukkan bahwa penerapan model *Project Based Learning* (PjBL) dalam e-modul memberikan dampak yang signifikan terhadap peningkatan kemampuan berpikir kritis siswa. Model pembelajaran berbasis proyek memberi kesempatan kepada siswa untuk berpartisipasi secara aktif dalam menyelesaikan permasalahan yang kompleks, sehingga mendorong mereka untuk berpikir secara kritis dan mendalam dalam mengevaluasi informasi. Hasil ini menegaskan bahwa penerapan PjBL dalam e-modul sangat penting sebagai strategi untuk membekali siswa menghadapi tantangan di abad ke-21.

## A. Introduction

Education has an important role in individual development, serving as a means to develop the potential and shape the character of students (Hakim & Darojat, 2023). The main goal of education is to ensure that students have skills and knowledge, a strong spiritual foundation, good character, and the ability to control themselves and behave nobly (Pratiwi et al., 2023). However, along with the rapid development of technology, the education sector faces significant challenges in adapting to technological advances that affect teaching methods in various educational institutions (Ridho et al., 2022).

The rapid development of digital technology has brought significant changes in various fields, including in the education sector. This development provides opportunities and challenges for the world of education (Huraerah et al., 2023). One of the significant challenges that arise is the need to quickly adapt both teachers and students in the face of these changes. Therefore, education must produce individuals who can compete globally, which requires innovation in learning methods (Zalsa et al., 2025). Although educational technology has developed, integrating technology in learning, especially in efforts to improve the quality of basic education, still faces significant obstacles (Wahyudi & Jatun, 2024).

Rapid technological developments and changing times have brought about a significant transformation in the world of education. This situation requires teachers and students to adapt to the various changes that take place (Muslimin & Fatimah, 2024). Educators are crucial in helping optimize students' potential and skills more comprehensively. In this modern era, education no longer relies solely on memorization or the ability to answer questions by relying on memory alone. However, it emphasizes students' ability to independently build and organize their understanding. In the context of this educational transformation, the role of teachers or educators is more directed as facilitators who help and guide students actively throughout the learning process. Using innovative and engaging teaching materials is very important (Kusuma & Muharom, 2024). Therefore, the learning materials must be adapted to the times, especially in the 21st century, by utilizing digital technology. This is important so that students do not only depend on learning resources in the form of printed textbooks (Mashudi, 2021).

The rapid development of digital technology has affected many aspects of life, including education. One major challenge is the need for teachers and students to quickly adapt to these changes. Education needs to produce human resources that can compete globally, which requires innovation in learning methods (Zalsa et al., 2025). Although educational technology has developed, integrating technology in learning, especially in efforts to improve the quality of basic education, still faces significant obstacles (Wahyudi & Jatun, 2024).

In the field, the problem encountered is that many educators still have not fully utilized technology in learning. This is due to teachers' limited understanding regarding technology use and the lack of facilities that support technology-based learning (Andriani & Widiyono, 2024). Many education systems still rely on traditional teaching methods,

which emphasize memorization and mastery of theory, without paying attention to developing students' critical and creative thinking skills. Many students have difficulty connecting the material learned with everyday life situations and are not accustomed to solving problems independently (Refnita, 2023).

One of the efforts to overcome these problems is to develop technology-based learning modules, namely e-modules. E-modules are digital learning media developed to encourage students' active participation in the learning process. Compared to conventional methods, e-modules provide opportunities for students to learn independently with various multimedia elements that can increase their motivation and attractiveness. E-modules provide learning materials and are equipped with project work guides, multimedia-based learning resources, and structured evaluation tools, which enrich students' learning experiences (Lastri, 2023).

This solution has become increasingly important in introducing the concept of project-based learning (PBL). PjBL is a learning method involving students in real-life projects, forcing them to work together, solve problems, and apply knowledge in everyday life. This approach has been proven effective in improving students' critical thinking, teamwork, and creativity (Ansyah, 2023). Incorporating PjBL-based e-modules allows students to learn, actively engage, and develop the skills needed to face real-world challenges. This approach provides a space for learners to engage in collaborative learning through project-based activities. This process supports the deepening of academic concepts and serves as a vehicle for character-building and social values. Students' active participation in the project allows them to contribute significantly to their social environment while internalizing the values of responsibility and empathy (Rahmawati, 2023). As a pedagogical approach, project-based learning emphasizes developing students' creativity, problem-solving ability, and collaborative skills. Through these activities, learners are empowered to actively build, apply, and develop conceptual understanding with their peers (Nugraha et al., 2023).

The results of Pratiwi et al (2023) show that the development of e-modules based on Project-Based Learning (PjBL) can significantly influence students' critical thinking skills at the elementary school level. The e-module designed with the PjBL approach is feasible based on the assessment of media and material experts. Validation results from media experts reached 86%, while validation from material experts reached 87%. The trial conducted on students yielded an average feasibility of 86%, which is considered feasible for learning IPAS in grade IV. Applying PjBL-based e-modules proved effective in improving students' critical thinking skills. Based on the N-gain test, the increase between the pre-test and post-test scores reached 0.710, which is classified in the high category. The difference in pre-test and post-test scores of 31 shows the effectiveness of e-modules in improving students' critical thinking skills. The integration of the two is still minimal, especially in its application in primary education. This indicates a gap that needs to be filled by this research, which focuses on applying PjBL-based e-modules designed to support the development of student's critical thinking skills. With PjBL-based e-modules, students can actively

participate in real projects, which facilitates them in applying learned knowledge to real-world situations and encourages them to think more analytically and evaluatively.

According to Maulita et al (2023), it shows that although e-modules as technology-based learning media have been widely applied, there are still limitations in their maximum use at the basic education level. Some schools in the research area show that although technology is available, e-modules have not been optimally utilized in the learning process. Many teachers and students still rely on physical textbooks and conventional learning methods, which limits the potential for developing students' critical thinking skills. This research aims to optimize the utilization of PjBL-based e-modules, hoping to encourage students to be more involved in the learning process that is more in-depth and time. Although many studies discuss the use of e-modules in education, there is still a gap in combining e-modules with the PjBL approach, especially at the basic education level. Some previous studies have discussed using e-modules separately without considering how e-modules can support collaborative activities and projects that involve solving real problems. In addition, although some studies show the benefits of using technology in education, research examining the impact of PjBL-based e-module integration on improving students' overall critical thinking skills is still limited.

This research aims to address this gap by exploring the application of PjBL-based e-modules in learning at the primary school level. This study will identify findings from previous research on using PjBL-based e-modules and analyze how this approach can improve students' learning achievement and critical thinking skills. This research is expected to provide a deeper understanding of the effectiveness of PjBL-based e-modules in improving the quality of primary education and contribute to the development of more interactive and technology-based learning models.

The contribution of this research is significant because it can provide a new understanding of the development of technology-based learning that is more effective and efficient at the basic education level. In addition, the findings of this study can serve as a guideline for educators, school principals, and education policymakers in designing learning models that are in line with the demands of the 21st century, which not only focus on mastering the material but also on developing the critical and creative thinking skills that students need to succeed in an increasingly digitized world.

The main objective of this study is to assess the extent to which the use of PjBL-based e-modules can improve students' critical thinking skills at the elementary school level. In more detail, this study aims to identify how to apply PjBL-based e-modules in the learning process in elementary schools, analyze the impact of using PjBL-based e-modules on student learning outcomes, with a focus on developing critical thinking skills, and provide recommendations that educators and educational policymakers can apply regarding the development and application of PjBL-based e-modules in basic education.

## B. Method

This article applies the Systematic Literature Review (SLR) method, which is an approach that aims to identify, analyze, assess, and interpret all relevant research results (Nengsih & Haryanti, 2024). This article adopts a Systematic Literature Review (SLR) approach that refers to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure the literature evaluation process is structured, clear, and precise. The review process is conducted through four main steps: identification, selection, feasibility evaluation, and inclusion (Anditha & Suwarna, 2024).



**Figure 1.** Systematic Literature Review Phase

In the identification stage, researchers searched for articles through various scientific databases such as Google Scholar, Scopus, and Sinta with relevant keywords such as e-modules, project-based learning, and critical thinking skills, with a publication time limit between 2018 and 2025. The articles were analyzed based on the study analysis question, namely, the various types of e-module development models and their effectiveness in improving critical thinking skills.

Inclusion and exclusion criteria were applied to ensure the articles analyzed were relevant to the study topic. The inclusion criteria used in this study include articles or journals published from 2018 to 2025, have a connection with the development of e-modules based on Project Learning PjBL), use samples from elementary, junior high, or senior high school education levels, and have been indexed in scientific databases such as Google Scholar, Sinta, or other repositories.

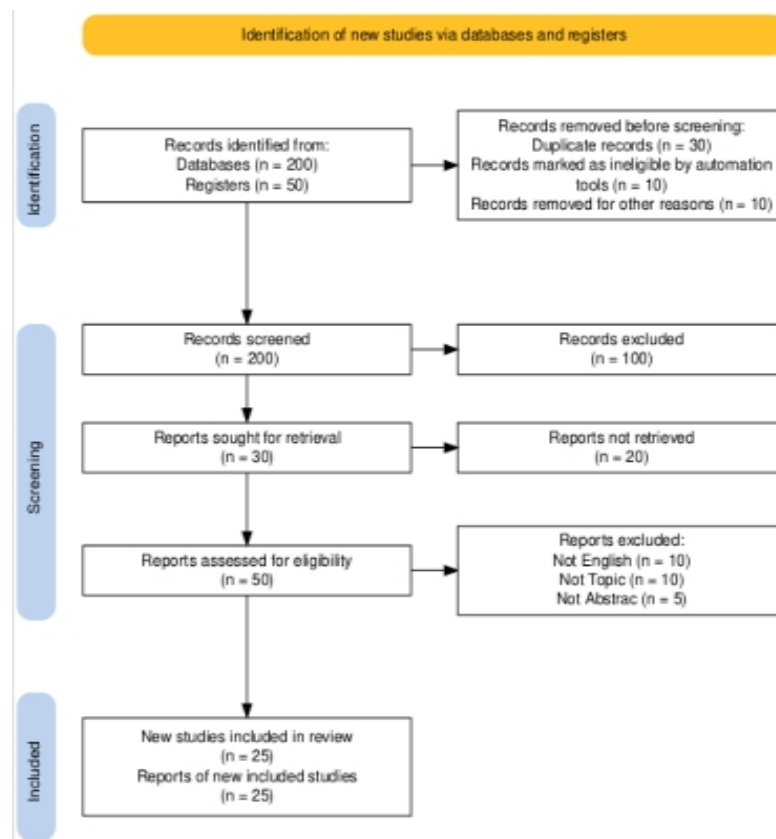
Exclusion criteria in this study included journals or articles published before 2018. The inclusion criteria were based on the relevance of the topic and the publication period between 2018 and 2025 to ensure that the data collected was up-to-date and in line with the latest developments in education. Exclusion criteria were applied to filter out articles deemed irrelevant or no longer in line with recent developments. After that, the database was organized, and keywords were searched. The reference search process was conducted through databases such as Google Scholar and Crossref with the help of the Publish or Perish application. The keywords used in the search included terms such as e-modules, Project Based Learning, and critical thinking skills.

**Table 1.** Inclusion and Exclusion Criteria

Criteria	Inclusion (Accepted)	Exclusion (Rejected)
<b>Type of Writing</b>	Scientific publications such as accredited	Non-scientific writings such

Criteria	Inclusion (Accepted)	Exclusion (Rejected)
	journals, seminar proceedings, or research report	as opinion articles, personal blogs, unpublished academic works
<b>Language Used</b>	Selected articles are written in Indonesian or English.	Articles written in languages other than Indonesian and English are excluded. In this study.
<b>Year of Publication</b>	Published within the last 10 years (e.g.: 2015-2025)	Published before 2015
<b>Conformity to Theme</b>	Focus discussion related to implementing, developing or evaluating e-Modules at elementary school.	It does not discuss e-Modules or is irrelevant to the context of primary education.
<b>Research Methods</b>	Articles must use a scientific approach, whether qualitative, quantitative, or mixed, with method research which explains clearly and systematically.	Does not use the scientific method, or the description of the method is not clear
<b>Completeness of Content</b>	Provides Data, Discussion, and the conclusion that is complete	The article does not present complete data or is only an abstract
<b>Document Accessibility</b>	The article can be accessed in full-text	Locked, paid, or just articles available in the form of a Summary

After all these steps, the data search results were presented in the form of a PRISMA diagram. The next step was data analysis, which involved compiling information from articles that met the inclusion criteria and assessing the quality of the research descriptively in order to provide a relevant understanding of the issues raised in the review questions.



**Figure 2.** Flowchart of Article or Journal Selection

From the initial search, 25 articles were obtained that were relevant to the focus of the study. Furthermore, the selected articles were then classified based on the main themes, such as e-modules, Project Learning (PjBL) learning model, and critical thinking skills. The content of each study was analyzed to assess the extent to which the Project Learning model positively impacts learning outcomes and strengthens students' critical thinking skills. At the end of the process, a synthesis of the analysis results is presented to provide an overview of the e-module based on the Project Based Learning model, indicating a significant increase in learning achievement and students' critical thinking skills after implementing the learning model.

## C. Result and Discussion

### Result

#### Data Analysis

Research on the development of e-modules assisted by Project-Based Learning (PjBL) aims to improve students' critical thinking skills at the elementary school level. Various development models and approaches have been applied in this research. Based on data analysis from previous studies, the ADDIE model is the most frequently used, recorded in 5 articles or journals. Furthermore, the Borg & Gall model was found in 4 articles, the 4-D model was found in 2 articles, the Dick & Carey model had two articles and Lee & Owens

was only found in 1 article. This trend shows that the ADDIE model will be more dominant in developing e-modules in primary education between 2018 and 2025. The ADDIE model was chosen due to its structured and flexible nature, which facilitates developing and evaluating technology-based e-modules.

### **Critical Assessment**

Of the 25 articles evaluated, 14 met the inclusion criteria, and 11 were excluded. Assessment of the results of the research that has been done shows that the application of PjBL-based e-modules has a significant impact on students' critical thinking skills. Research by Pratiwi et al (2023) and Amalia et al (2023) indicated that PjBL-assisted e-modules successfully improved students' critical thinking skills. This is stated in the results of the N-Gain analysis, which shows a significant increase and other statistical tests. However, some of these studies have limitations, such as subject limitations that only involve fourth and fifth-grade elementary school students.

Nevertheless, the findings of these studies provide strong evidence of the positive impact of implementing e-modules with PjBL in developing students' critical thinking skills at the basic education level. Research by Qonita & Handayani (2023) also showed that integrating the PjBL model with the Wordwall platform positively impacted students' material understanding, especially regarding gravitational force. Based on the t-test, a significant difference was found between the experimental group and the control group, indicating that using the Wordwall platform in PjBL has a significant positive effect on student understanding. Nonetheless, a long-term evaluation of the application of technology in learning needs to be conducted to ensure its effectiveness over a more extended period.

### **Literature Review Results**

From the literature review, the application of PjBL-based e-modules is increasingly being used in basic education to support the development of the PjBL-based e-module students' critical thinking skills. Analysis of the 14 articles reviewed showed that the ADDIE model was most often applied in developing e-modules, recorded in 5 articles. The Borg & Gall model was used in 4 articles, and the 4-D model in 2 articles, Dick & Carey, there were two articles and Lee & Owens was also found in 1 article. Its use was more limited, namely the dominance of the ADDIE model, indicating that a systematic and structured approach is efficient in designing and developing technology-based e-modules for learning in elementary schools.

### **Data Analysis Matrix Literature Review**

The data analysis matrix in this literature review covers several important parameters of each study analyzed, including the development model used, research

subjects, data analysis methods, and results obtained. This matrix illustrates the results of data analysis from various studies that have been reviewed :

**Table 2.** Data Analysis Matrix Literature Review

Author, Title, Journal	Method Design	Results
Murni, A. W., & Yasin, F. N. (2021). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Proyek pada Materi Siklus Air Kelas V Sekolah Dasar. <i>Jurnal Basicedu</i>	Borg & Gall	The student worksheets developed were assessed as valid and practical, with a gain score of 0.41, indicating a moderate increase in learning outcomes.
Hasibuan, N., & Nasution, H. A. (2025). Pengembangan E-Modul Berbasis Project Based Learning (PjBL) Menggunakan Flipbook pada Materi Laju Reaksi. <i>Jurnal Ilmiah Profesi Pendidikan</i>	ADDIE	The developed e-module successfully increased students' interest in learning and learning outcomes. The validity of the module and the increase in students' interest in learning were positive, although quantitative data has not been explained in detail.
Ningtyas, R. K., & Jati, H. (2018). Project-Based Electronic Module Development as a Supporting Learning Media for Basic Programming Learning. <i>Journal of Educational Science and Technology</i>	Lee & Owens	The developed module was rated suitable by design experts and very feasible by material experts. The beta evaluation showed that 71.4% stated that the module was 'feasible'.
Muwaffaqoh, D., Kirana, T., & Rachmadiarti, F. (2021). The Development of E-Book Based on Project Based Learning on the Plant Anatomy Structure Material. <i>IJORER: International Journal of Recent Educational Research</i>	4D	The e-books developed were considered theoretically and empirically valid, with increased student learning outcomes showing a medium category N-gain.
Dwiningsih, K., Sukarmin, S., Lutfi, A., Hidayah, R., Suyono, S., Azizah, U., & Alya, A. (2024). Development of E-Learning Based PBL-STEM Learning Tools on Students' Science Process Skills and Critical Thinking Ability. <i>Jurnal Penelitian Pendidikan IPA</i>	Borg & Gall	The e-learning tools developed successfully improved students' critical thinking and science process skills, with significant improvements measured using N-Gain.
Pratama, Y., Nur Kumala, F., & Dwi Yasa, A. (2024). Development of PjBL E-Modules Based on Spring Suite on Alternative Energy Sources of Water for Elementary Students. <i>Jurnal Bidang Pendidikan Dasar</i> , 8(2), 205–216.	ADDIE	The e-module is considered valid and practical, improving students' understanding of alternative energy sources of water, as evidenced by the pre-and post-test results.
Turnip, R. F., Rufi'i, R. I., & Karyono, H. (2021). Pengembangan E-Modul Matematika dalam Meningkatkan Keterampilan Berpikir Kritis. <i>JEMS: Jurnal Edukasi Matematika dan Sains</i>	Dick & Carey	The e-module significantly improved students' critical thinking skills, with a Cohen's d value of 1.50, indicating a large effect.
Dalifa, D., Winarni, E. W., & Nirwana, N. (2024). Thematic E-Modules Using the PjBL Model Based on STEAM to Enhance Science Literacy and HOTS. <i>IJIS Edu: Indonesian Journal of Integrated Science Education</i>	Borg & Gall	With significant pre-and post-test results, The e-module improved science literacy and HOTS.

Author, Title, Journal	Method Design	Results
Alamin, A., Nurhanurawati, N., Rohman, F., & Perdana, R. (2024). Development of Learning E-Modules Based on Contextual Teaching and Learning on the Material of Changing the Form of Energy to Improve Students' Science Literacy. <i>Jurnal Penelitian Pendidikan IPA</i>	Borg & Gall	The e-module improved students' science literacy, which was measured through paired t-tests that showed a significant difference after using the e-module.
Manzil, E. F., & Thohir, M. A. (2022). Pengembangan E-Modul Interaktif Heyzine Flipbook Berbasis Scientific Materi Siklus Air Bagi Siswa Kelas V Sekolah Dasar. <i>Sekolah Dasar: Kajian Teori dan Praktik Pendidikan</i>	ADDIE	There was a significant improvement in the quality of learning, with pre-test and post-test results showing improved student engagement and performance.
Suantara, K. A., Gading, I. K., & Sanjaya, D. B. (2023). E-modul Berbasis Kearifan Lokal Satua Bali untuk Meningkatkan Hasil Belajar IPAS Siswa Sekolah Dasar. <i>Jurnal Ilmiah Pendidikan dan Pembelajaran</i>	ADDIE	The module improved student learning outcomes effectively, with a significant increase from pre-test to post-test.
Widiastuti, N. L. G. K. (2021). E-modul dengan Pendekatan Kontekstual pada Mata Pelajaran IPA. <i>Jurnal Ilmiah Pendidikan dan Pembelajaran</i>	ADDIE	E-modules increase student engagement and understanding of the material, with positive teacher and student feedback.
Pratiwi, K. F., Sulianto, J., & Sumarno. (2023). Pengembangan E-Modul Berbasis Project Based Learning untuk Meningkatkan Kemampuan Berpikir Kritis Siswa Kelas IV Sekolah Dasar. <i>Didaktik: Jurnal Ilmiah PGSD STKIP Subang</i>	Dick & Carey	The e-module was rated highly feasible by experts (86%) and showed significant improvement in students' critical thinking skills based on pre-and post-test comparisons.
Rahmani, Z., & Hikmawan, R. (2025). Pengembangan E-Modul Interaktif pada Mata Pelajaran Matematika untuk Meningkatkan Kemampuan Berpikir Kritis Siswa Sekolah Dasar. <i>Didaktika: Jurnal Kependidikan</i>	4D	The e-modules improved students' critical thinking skills and engagement in mathematics, with large effect sizes and positive responses from students and teachers.

This matrix provides a clear picture of the diversity of e-module development models used in the studies reviewed and the results achieved in each study. Findings reinforce the conclusion that applying PjBL-based e-modules contributes positively to the development of students' critical thinking skills. However, there are differences in the methodology applied in each study.

## Discussion

Various learning approaches have been identified as effective ways of developing students' critical thinking skills. Based on the literature review, several methods have been proposed, including project-based learning (PjBL), STEM approaches, and interactive

technology. Conventional teaching materials still lack support for interdisciplinary approaches such as STEAM (Science, Technology, Engineering, Arts, Mathematics) and project-based learning (PjBL), so further development is needed to optimize this potential to develop STEAM-based thematic E-Modules with PjBL models that are valid and feasible to use (Dalifa et al., 2024).

Learning in elementary schools requires innovative media to make it more interesting and effective for students. However, many schools still use conventional learning methods that are less interactive, so students have difficulty understanding the material in depth. So, this research focuses on the development, feasibility, and practicality of E-Modules as a solution to improving the effectiveness of learning in elementary schools. The development of PjBL e-modules based on the spring suite on alternative water energy sources for elementary school students has an impact on more effective learning (Pratama et al., 2024)

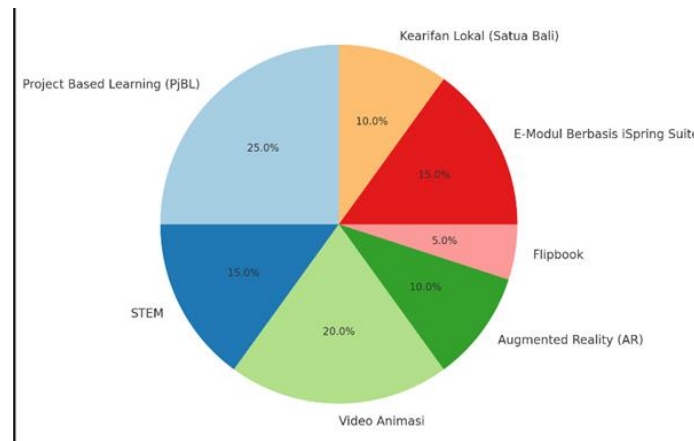
According to Sae & Radia (2023), Using animated video media in science learning has improved students' critical thinking skills in elementary school. Another article also explains that Augmented Reality Media can provide students with experiences to think more deeply and critically (Izdihar et al., 2024). Using interactive media, such as flipbooks, to develop students' critical thinking skills in science subjects (Aprilia, 2021).

Animated video media has proven effective in improving students' critical thinking skills, especially in science learning. According to Sae & Radia (2023), Media presents learning materials in an engaging visual format, which helps students understand complex concepts and encourages them to think more deeply. Augmented Reality (AR) technology offers a more real and interactive learning experience. Based on research by Retnaningtyas et al. (2021) shows that AR can improve students' critical thinking skills because it facilitates exploration and understanding of the material through direct simulation. In addition, context-based flipbook media is considered effective in improving critical thinking skills in elementary school students. Aprilia (2021) found that this media in science lessons encourages students to think analytically and reflectively. Qonita & Handayani (2023) showed that applying the Project Based Learning (PjBL) learning model combined with the Wordwall platform was practical in improving student understanding.

Implementing digital media such as AR and animated videos still faces obstacles in the form of limited supporting facilities. Faridatus et al (2025) revealed that uneven infrastructure is the main obstacle to integrating AR into learning. Teacher competence is needed in the optimal use of digital media. If teachers are not accustomed to or have not received training, the effectiveness of learning media may decrease. Developing and implementing interactive media requires considerable time, resources and costs. Schools with limited resources may have difficulty in adopting this approach thoroughly.

Another innovation was proposed by Suantara et al (2023), creating e-modules based on local wisdom of Balinese satua for IPAS learning aims to improve learning outcomes of grade IV elementary school students. IPAS learning in grade IV has not been implemented optimally due to the low motivation of students in participating in IPAS lessons, which can

be seen from the low participation of students, especially in question-and-answer activities during the learning process.



**Figure 3.** Media diagram in e-module development

The distribution of media use in developing e-modules for learning can be explained as follows: Project Learning (PjBL) media dominated with a percentage of 25%, followed by Animated Video, which recorded 20%. STEM accounts for 15%, equivalent to using iSpring Suite-based E-modules. Augmented Reality (AR) and Local Wisdom (Satua Bali) each contributed 10%. , Flipbook has the lowest proportion of usage, at 5%. This data provides insight into the prevalence of media applied in developing e-modules as a strategy to improve the quality of learning at the primary level.

#### **D. Conclusion**

This research proves that Project Based Learning (PjBL) effectively improves students' critical thinking skills at various levels of education, based on a literature evaluation conducted with the PRISMA approach. Project Learning focuses on real project-based learning, helping students develop analytical, evaluative, and creative thinking skills. This research also shows that Project Based Learning strengthens metacognitive skills important for critical thinking.

This research implies that implementing Project Based Learning can improve students' critical thinking skills, especially at the basic education level. Through Project Based Learning, students can connect theoretical knowledge with real situations, enriching their learning experience and encouraging them to think more applicatively. In addition, using interactive technologies such as animated videos and augmented reality can enrich the application of Project Learning, giving students a more interesting learning experience and motivating them to be more active in the learning process.

Future research is recommended to further explore how external factors, such as infrastructure and teacher competence, affect the effectiveness of PjBL implementation. Research also needs to compare PjBL with other learning approaches in improving critical

thinking skills. Research conducted at various levels of education and more diverse subjects can provide a deeper understanding of the effectiveness of Project Based Learning more broadly.

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