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DEVELOPMENT OF INTERACTIVE FLIPBOOKS TO IMPROVE UNDERSTANDING OF VECTOR CONCEPTS IN GRADE XI

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Abstract :
This research aims (1) to determine the validity of flipbook learning media as a tool for learning physics in vectors; (2) to determine the practicality of flipbook learning media as a tool for learning physics in vectors; (3) to determine the effectiveness of flipbook learning media as a tool for learning physics in vectors. The type of research used is Research and Development with ADDIE (Analysis, Design, Development, Implementation, Evaluation) design. The research subjects comprised 4 validator trials, with 2 lecturers as media experts and 2 physics subject teachers as material experts, as well as 36 students from SMA Negeri 1 Ende. Data collection was conducted using questionnaires and test methods. The results of the study showed that the assessment by material experts was categorized as very valid (88%), the assessment by media experts was categorized as very valid (92%), the assessment by participants through a practicality questionnaire was categorized as very practical (96%), and the assessment of student learning outcomes through pretests and posttests was categorized as high (0.76). This shows that the flipbook learning media is valid, practical, and effective.

Keywords: Concept Understanding, Flipbook Development, Vector Material

INTRODUCTION

Education is one of the efforts to enlighten the nation's life and improve human resources, carried out to help Indonesian citizens develop into quality, independent, and proactive human beings in responding to the challenges of an ever-changing era. The existence of education is very important for a country because it has a big influence on the condition and development of the nation (Rahmadila et al., 2023). In the context of the 21st century, education is required to transform the way it learns and teaches in order to be able to produce a generation that is ready to face global challenges (Magay et al., 2025). Education is not only seen as a process of transferring information, but also as an effort to develop skills, attitudes, and values that are relevant to the needs of current and future life (Rahman et al., 2022).

One field of study that plays an important role in education is physics. Mahardika et al. (2023) state that Physics is an important subject in secondary education because it helps develop critical thinking, analytical skills, and problem-solving. One of the basic concepts that students must master is vectors, as they are a prerequisite for understanding advanced physics topics such as motion, force, and

electric fields. However, vectors are often considered abstract and difficult to understand when presented conventionally through textbooks or lectures. In today's digital era, technology-based learning media innovations, such as interactive flipbooks, are highly relevant because they can present more engaging, interactive visual representations (Amalissholeh et al., 2023).

Effective education in physics can help students develop their critical thinking skills (Kamaruddin et al., 2023). However, challenges in physics learning are often related to monotonous teaching methods and a lack of engaging, interactive learning media. Monotonous teaching in an educational context is a practice in which the same method or approach is repeated without significant variation. This can result in a lack of student interest in learning physics. In an educational context, learning media is needed as a tool that can influence the atmosphere, conditions, and learning environment created by the teacher (Yuniarrahmana et al., 2021). Learning media serves as a link that facilitates the teaching and learning process and improves communication between teachers and students. This greatly assists teachers in teaching and makes it easier for students to understand and absorb the subject matter (Halawa, 2022). One learning medium that can facilitate the teaching and learning process is the flipbook. Developing interactive digital learning media like flipbooks is crucial for increasing student motivation and active engagement in learning, thus helping them understand concepts in depth and context (Suryaningrat et al., 2023).

A flipbook is a type of digital book that can display text, images, audio, and video, designed in an interesting way to increase students' interest and understanding during the learning process (Masithoh, 2022). Through various interactive features such as text, animation, and video, flipbooks are expected to contribute to helping students understand physics concepts, especially regarding vector material (Ruanda et al., 2025). Based on research Juliani & Ibrahim (2023) there are several benefits to using flipbooks as a learning medium. First, flipbooks convey learning material in a concise and clear manner (Dinanti et al., 2024). Second, flipbooks can be accessed anytime and anywhere (Natasya, 2025). Third, flipbooks are very practical. Fourth, they have the potential to increase students' enthusiasm for learning. Flipbooks are considered appropriate for delivering material on vectors. Through flipbooks, students can more easily understand the lesson and be stimulated by curiosity. The flipbook's appearance is created using Anyflip software, which is supported by several other programs such as Microsoft Word, Canva, and Capcut (Salsabilah et al., 2024).

However, despite the many benefits of digital technologies like flipbooks, their implementation in school settings still faces several challenges. One significant issue is the reliance on printed textbooks as the primary source of information in the learning process (Ningsih & Ulya, 2024). This dependency can hinder creativity, active engagement, and the use of digital technology in modern learning (Fitri et al., 2024). According to Wahyudin et al. (2022) printed textbooks are static, less interactive, and unable to adapt to curriculum changes or student learning needs flexibly. Furthermore, printed textbooks cannot provide multimedia content such as animations and videos, which are essential for learning abstract concepts in physics (Purnomo et al., 2024). Flipbooks have advantages over traditional printed books because they can include multimedia elements such as animation, video, images, and audio. These elements not only make learning more engaging but also increase student engagement and support a variety of learning styles (Wibowo & Pratiwi, 2018).

Based on observations, learning often still relies on textbooks as the primary source. While textbooks are crucial for conveying basic information and concepts, this method has several limitations. First, textbooks tend to be static and do not provide interactive experiences that can enhance student understanding (Hermansyah & Zaus, 2025). Second, students often feel bored and less motivated when learning only through text and images that are not dynamic (Susanti et al., 2024). This can lead to low interest in learning and limited conceptual understanding, especially in complex topics such as Newton's laws of motion in physics. Furthermore, with the rapid development of information and communication technology, students are becoming more familiar with digital media. They are more attracted to interactive and engaging content, such as videos, animations, and web-based applications. Therefore, more innovative learning resources are needed to increase learning effectiveness.

Observations and several studies show that many high school students struggle to understand vector operations, particularly addition, subtraction, and graphical representation. Teacher-centered learning, minimal use of digital media, and limited visualization make students less motivated and more likely to memorize rather than understand concepts (Narpilla et al., 2025). This condition has resulted

in low physics learning outcomes, particularly in vector material, which should be easier to understand through visual and interactive media.

Various previous studies have shown that interactive digital media can improve students' conceptual understanding. For example, research by Agustina & Fitrihidajati (2020) proved that the use of digital flipbooks can increase student engagement and learning outcomes in science learning. Other research by Mutmainna et al. (2022) also emphasized that technology-based media can facilitate the understanding of abstract concepts through more concrete visualizations. However, this research still shows a lack of development of interactive flipbook media specifically focused on vector material at the high school level. Most previous studies have focused on other topics, such as waves or Newton's laws. This demonstrates the novelty of this research: presenting an interactive flipbook that emphasizes the basic concepts of vectors in a visual and interactive manner.

If this problem is not addressed immediately, students' understanding of vector concepts will remain low, making it difficult for them to learn advanced physics concepts. The long-term negative impact is the low quality of physics instruction in secondary schools and the weakening of students' analytical abilities in facing academic and practical challenges (Pagarra et al., 2022).

Based on the description above, the aim of this study is to determine the validity, assess the practicality, and test the effectiveness of interactive flipbook media in learning vector material for class XI high school students.

RESEARCH METHOD

Type of Research

The type of research used is Research and Development (R&D). According to Rahmawati et al. (2023) this research focuses on the product. The research design used in this study is ADDIE (Analysis, Design, Development, Implementation, Evaluation). The ADDIE model is a systematic framework for instructional design that consists of five main stages: Analysis, Design, Development, Implementation, and Evaluation, which are used sequentially to design, develop, and assess the effectiveness of learning (Mesra et al., 2023).

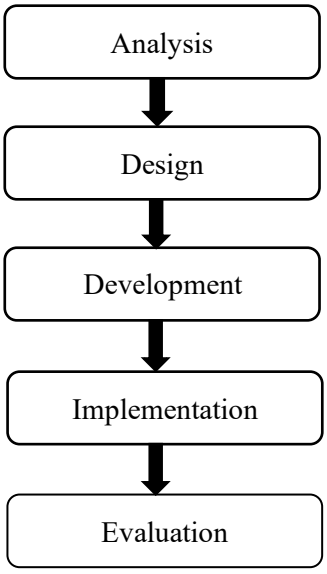

Figure 1. ADDIE Model Stages

This research was conducted at State Senior High School 1 in Ende Tengah District, Ende Regency, from August 28 to September 9, 2025. The purpose of this study was to determine the validity, practicality, and effectiveness of interactive flipbook media.

Research Target/Subject

The subjects of this study were media experts, material experts, and students of class XI-1 IPA at SMA Negeri 1 Ende. The object of this study was to develop flipbooks as a physics learning aid, especially for vector material.

Research Procedure

It is hoped that this flipbook learning media can improve students' learning abilities and help teachers in carrying out the learning process (Setyorini & Sukarmin, 2024). In addition, it is hoped that this learning media can help students learn independently, both individually and in groups.

1. Analysis Stage

At this stage, the researcher conducted a needs analysis, which included identifying problems in the field through interviews with physics teachers to determine students' difficulties with vector material, analyzing students' needs to adapt media to learning conditions, and analyzing the curriculum and learning objectives by referring to the Independent Curriculum, so that the flipbook material is in accordance with the expected achievements.

2. Design Stage

At this stage, researchers design and develop products according to needs, namely, creating attractive flipbooks to present learning vector material. The design is carried out by arranging the content's structure and sequence logically, starting with the introduction, material description, sample questions, exercises, and discussions, and concluding with standard sections such as the cover, foreword, learning objectives, and bibliography. In addition, researchers design the visual layout and elements, including color, typography, icons, illustrations, and user-friendly page layouts. This stage also includes collecting and creating supporting media elements, such as images, short videos, animations, and interactive symbols, to enhance the flipbook's appearance.

3. Development Stage

At this stage, researchers began developing the content and appearance of the flipbook by transforming the previously prepared material structure into a concrete digital product (Prototype I) using applications such as Canva, Flip PDF, or PowerPoint. The resulting product was then validated by two physics teachers, who assessed its accuracy, completeness, conceptual accuracy, and relevance to the learning objectives. Furthermore, validation was also carried out by media experts, namely two physics education lecturers from the University of Flores, who assessed the appearance and quality of the media using a provided validation sheet.

4. Implementation Stage

The fourth stage is the use of the product developed during the trial activities by students. The flipbooks given to students aim to gauge their responses to the developed media, namely by administering questionnaires and tests.

5. Evaluation Stage

The evaluation stage is conducted to assess the quality and success of the flipbook learning media from the analysis stage through the implementation stage.

Instruments and Data Collection Techniques

Research data collection techniques are methods used to collect the information needed for a study or research. The data collection techniques used in this study can be described in the following table.

Table 1. Data collection technique

Data	Data collection technique	Data Analysis Techniques
Needs analysis	Subject teacher interview	Qualitative description
Validation questionnaire	Media expert validation sheet and subject matter expert validation sheet	Quantitative description
Limited trial results	Student response questionnaire	Quantitative Description
Student learning outcomes	Test (Pretest and posttest)	Quantitative Description

Data Analysis Technique

The analysis technique used in this research and development is a qualitative and quantitative descriptive analysis technique with a percentage method (Waruwu, 2023). Descriptive analysis was used to describe the development results, and quantitative analysis was used to analyze the validation results and student responses. Furthermore, the data obtained using the data collection instruments were analyzed using analytical techniques and percentages according to a predetermined formula (Husein & Rusimamto, 2019). Learning media are suitable if they meet three criteria: validity, practicality, and effectiveness.

Expert Validation Analysis

Validity is a measure of how effectively a tool, media, or learning device can measure or reflect what should be measured or formed, according to relevant theory and needs (Yusuf et al., 2023).

a. The validity of the learning media created can be seen from the assessment data results using a rating scale. The calculation is as follows.

$$V_a = \frac{T_{se}}{T_{sh}} \times 100\%$$

With:
V_a= validity of the expert
T_{se}= total empirical score obtained
T_{sh}= maximum total score

b. Determine the total score of each validator by adding up all the scores obtained from each indicator.

Table 2. Expert Validation Criteria

Achievement Value (score)	Validity Category
25.00%-40.00%	Invalid
41.00%-55.00%	Less valid
56.00%-70.00%	Quite valid
71.00%-85.00%	Valid
86.00%-100.00%	Very valid

Table 2 describes the criteria for assessing instrument validity based on the percentage of achievement scores provided by experts. The higher the percentage of achievement, the higher the instrument's validity.

Practicality Analysis

Practicality is one of the indicators of the quality of learning devices that measures the extent to which the device or media is easy to use, understand, and implement by users (teachers and students) in learning (Milala et al., 2021). The practicality of a medium is used as a benchmark for assessing the feasibility of a learning medium (Adi et al., 2020). To determine the practicality of a learning medium, it is assessed by its implementation during product trials. The formula for calculating practicality data is:

$$P = \frac{f}{N} \times 100\%$$

With:
P = presentation of media practicality
f =maximum expected total score
N = total empirical score of the results of the trial

Table 3. Percentage Range and Practicality Criteria

Percentage Range (%)	Practicality Criteria
85%-100%	Very practical
70%-84%	Practical
40%-54%	Less practical
0%-39%	Not practical

Table 3 presents the categories of instrument practicality based on the percentage range of the assessment. The higher the percentage, the more practical the instrument is considered.

Effectiveness Analysis

According to Riawan et al. (2020) Effectiveness is the degree of success of an action or effort in achieving a predetermined goal. It indicates how well a process, activity, or plan can produce the desired results. According to Kumalasari & Widodo (2025) effectiveness is measured by the increase in student learning outcomes obtained when students work on pretest and posttest questions. Furthermore, it is analyzed using the normalized N-gain score formula (N-Gain). The N-gain test aims to determine the effectiveness of using a method or treatment in pretest-posttest design research (Karopak et al., 2023).

$$N - Gain = \frac{skor\ posttest\ siswa - skor\ pretest\ siswa}{skor\ posttest\ maksimal - skor\ pretest\ siswa}$$

Table 4 presents the interpretation of N-Gain values used to determine the level of improvement in learning outcomes after the treatment is applied. The N-Gain score helps identify the extent of change from the pre-test to the post-test.

Table 4. Interpretation of N-Gain

N-Gain	Classification of Improvement
$g > 0{,}70$	Tall
$0{,}30 < g \leq 0{,}70$	Currently
$g \leq 0{,}30$	Low

Based on the classifications in Table 4, a high N-Gain value indicates significant improvement, a moderate value reflects a reasonable level of improvement, and a low value indicates minimal improvement.

RESULTS AND DISCUSSION

This research aims to develop learning media in the form of flipbooks as a learning aid for physics, specifically for the vector material for grade XI high school students. The research method used is Research and Development with the ADDIE model, which includes five stages: Analysis, Design, Development, Implementation, and Evaluation.

1. Analysis Stage

In the analysis phase, interviews with physics teachers at SMA Negeri 1 Ende revealed students' difficulties in understanding vector concepts due to the reliance on textbooks and lecture methods. Furthermore, students' need for interactive, visual, and easily accessible learning media was identified as the basis for developing a *flipbook*.

2. Design Stage

The design phase resulted in a systematic design of the flipbook's content structure and material sequence, in accordance with the Merdeka curriculum. This included a cover, foreword, table of contents, learning outcomes, learning objectives, material descriptions, sample questions, evaluations, and a bibliography. The visual design considered color, layout, fonts, illustrations, and digital supporting media to facilitate comprehension.

3. Development Stage

During the Development phase, an initial flipbook prototype was created using the Flip PDF application and Canva for visual design. It was then validated by two subject matter experts and two media experts. The following data is from the assessment of the flipbook learning media by the subject matter experts and media experts:

Table 5. Flipbook Media Assessment Results Data (Material Expert)

No	Indicators assessed	Tse	Percentage (%)	Criteria
1	Compliance with the curriculum	4.0	100	Very Valid
2	Presentation of Material	3.6	90	Very Valid
3	Contextual	3.5	88	Very Valid
4	Evaluation	3.0	75	Valid
	Average	3.53	88	Very Valid

Table 5 shows that the assessment of flipbook media by material experts received 100% on the indicator of suitability with the curriculum, 90% on the presentation of material, 88% on the contextual, and 75% on the evaluation. The highest score reviewed from several indicators above is 100% on the indicator of suitability with the curriculum, then the second is on the indicator of presentation of material 90% so it is categorized as very valid, and the lowest score reviewed from several indicators above is contextual 88%, evaluation 75% with the valid category. The average across all indicators is 88%, so it is categorized as very valid. It can be concluded that the learning materials in the flipbook can be used with revisions.

Table 6. Flipbook Media Assessment Results Data (Media Expert)

No	Assessment Indicators	Tse	Percentage %	Category
1	Appearance	3.6	89	Very Valid
2	Material	3.8	96	Very Valid
	Average	3.7	92	Very Valid

Based on Table 6, the flipbook media assessment by media experts received a percentage of 89% for the display indicator and 96% for the material indicator. The highest score among the two indicators above was 96% for the display indicator, placing it in the very valid category. Moreover, the lowest score from the two indicators above was 89% for the material indicator. So the average of the two indicators was 92%, which is very valid. Therefore, the flipbook learning media can be used with revisions.

4. Implementation Stage

The implementation stage in this study involves applying the developed flipbook media. The implementation was carried out in class XI-1 IPA of SMA Negeri 1 Ende from July 28 to August 9, 2025. The aim was to determine the extent to which flipbook learning media can be used effectively in teaching and learning. The following are data from the student response questionnaire and student learning outcomes:

Table 7. Results of the Practicality Questionnaire Assessment

No	Indicators assessed	Percentage Score (%)	Criteria
1	Visual interest	98	Very Practical
2	Ease of Use	98	Very Practical
3	Clarity of Content	97	Very Practical
4	Benefits in understanding the material	93	Very Practical
	Average	96	Very Practical

Based on Table 7, all indicators assessed by students met the criteria of being very practical. The average score was 96%, thus establishing the flipbook learning media as highly practical. Very practical means that the flipbook media is suitable for use in physics learning.

Table 8. Student Learning Outcomes

Average pretest score	Average post-test score	Maximum score	N-gain	Category
65	91.67	100	0.76	Tall

Based on Table 8, the N-Gain value of 0.76 is classified as high ($g > 0{,}70$).” Thus, it is proven that flipbook media is effective in improving student learning outcomes $g > 0{,}70$

5. Evaluation Stage

The evaluation phase confirmed that the developed flipbook met the criteria for validity, practicality, and effectiveness as a physics learning medium. The development process, from needs identification to final evaluation, resulted in an innovative and practical learning medium for improving student learning outcomes.

The validation results showed that the flipbook media received excellent scores from both the subject matter expert and media expert validators, as well as high student practicality responses. The average pretest–posttest score increased significantly with a high N-Gain category. Critically, while these results demonstrate the effectiveness of flipbooks, it is important to note that the novelty effect and extra teacher attention during testing may have contributed to this improvement; the study design using a one-group pretest–posttest is susceptible to pretest effects, and the more controlled conditions of the practical work compared to a traditional classroom. Compared with previous research, these findings align with the results of a network meta-analysis on interactive learning environments, which found that formats such as augmented reality (AR), mixed reality (MIX), and digital games produce higher cognitive and affective effects than conventional methods. However, the magnitude of the effects varied across studies. For example, (Koç & Kanadlı, 2025), found that MIX had the most significant overall effect in science education, while AR was significantly superior in affective aspects compared to VR.

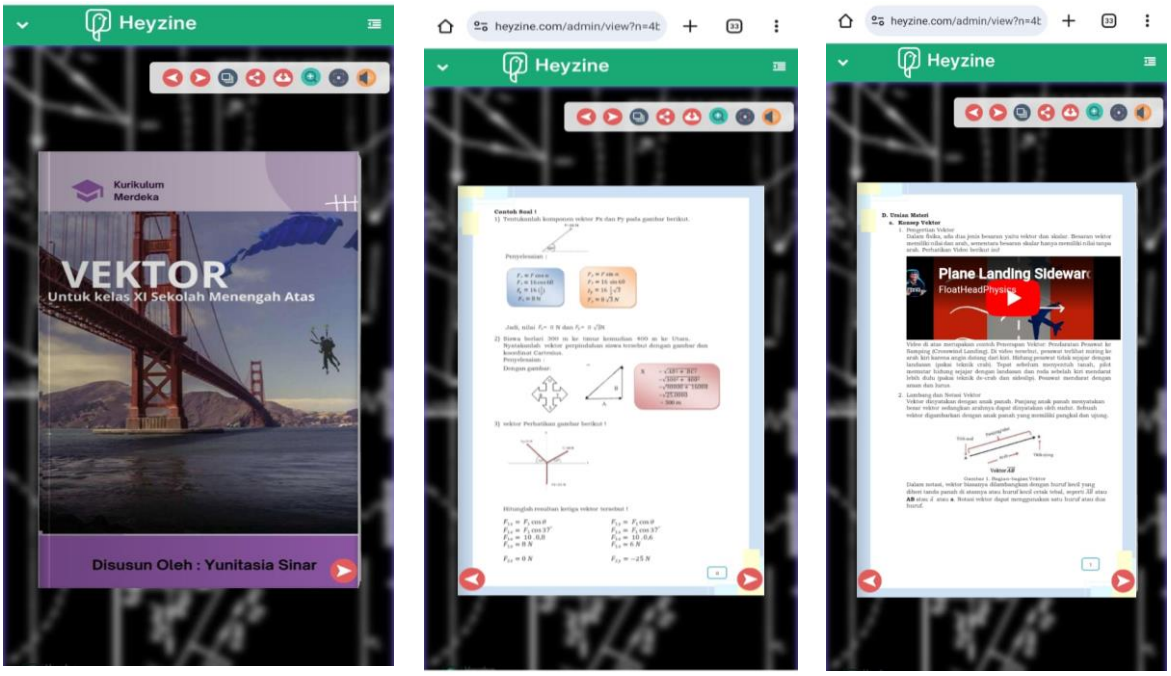

Figure 2. Product development results image

The theoretical implications of this research support Richard E. Mayer's Cognitive Theory of Multimedia Learning (CTML), which states that the combination of visual and verbal (dual-channel), limited cognitive capacity, and active processing is key to meaningful learning. Recent studies, including "The Past, Present, and Future of the Cognitive Theory of Multimedia Learning." (Mayer, 2024), reinforce that multimedia design principles are grounded in empirical evidence and remain highly relevant in the development of interactive digital media.

However, this study has several limitations: a limited sample size and the involvement of only one class, which limits the generalizability of the results to schools with different infrastructure and teacher competencies. The short measurement duration did not allow for long-term retention assessments, and data on media usage or qualitative classroom observations did not complement the use of subjective practicality questionnaires. These limitations indicate the need for further studies using quasi-experimental designs (RCTs), retention measurements collected after several weeks or months, and triangulation of data to gain a more comprehensive understanding of the effectiveness of flipbooks.

CONCLUSION

Based on the research conducted, it can be concluded that the interactive flipbook learning media for vector material for grade XI high school students has high validity. This is evidenced by the assessment scores of 88% from material experts and 92% from media experts, indicating the content's suitability with the curriculum and the quality of the material presentation. In addition, this media is highly practical, with a practicality score of 96% according to student assessments, indicating ease of use and high visual appeal. The effectiveness of the flipbook is also evident in the significant increase in student learning outcomes, with an average pretest score of 65 and a posttest score of 91.67, as well as an N-Gain value of 0.76, which falls within the high category. The implications of these findings indicate that interactive flipbooks can be an effective solution for learning physics, especially vector material, thereby improving students' conceptual understanding and motivation to learn. Therefore, it is recommended that this media be applied more widely in schools as an engaging and effective learning alternative. As a reflection, this study has limitations in the number of samples and the scope of research subjects, so further research with a broader sample and a variety of learning materials is expected to strengthen the results and development of this digital learning media.

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REFERENCES

Adi, N. H., Fernandes, A. L., & Hermansyah. (2020). Pengembangan media pembelajaran berbasis android pada mata kuliah fisika dasar. *Cetta: Jurnal Ilmu Pendidikan*, *3*(1), 103–114. https://doi.org/10.37329/cetta.v3i1.414

Agustina, D. W., & Fitrihidajati, H. (2020). Pengembangan flipbook berbasis problem based learning (pbl) pada submateri pencemaran lingkungan untuk melatihkan keterampilan berpikir kritis peserta didik kelas x sma. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *9*(2), 325–339. https://doi.org/10.26740/bioedu.v9n2.p325-339

Amalissholeh, N., Sutrio, S., Rokhmat, J., & Gunada, I. W. (2023). Analisis kesulitan belajar peserta didik pada pembelajaran fisika di SMAN 1 Kediri. *Empiricism Journal*, *4*(2), 356–364.

https://doi.org/10.36312/ej.v4i2.1387

Dinanti, P. Z., Artanti, G. D., & Febriana, R. (2024). Pengembangan media pembelajaran flipbook digital pembuatan chiffon cake. Jurnal Ilmiah Wahana Pendidikan, 10(23), 569-579. https://doi.org/10.5281/zenodo.14573564

Fitri, A., Saptono, A., & Pratama, A. (2024). Penggunaan media pembelajaran berbasis digital dalam meningkatkan hasil belajar. *EKOMA : Jurnal Ekonomi*, *3*(4), 555–565. https://doi.org/10.56799/ekoma.v3i4.3532

Halawa, T. (2022). Pengaruh media pembelajaran terhadap minat belajar siswa. *Curve Elasticity: Jurnal Pendidikan Ekonomi*, *3*(1). https://doi.org/10.57094/jpe.v3i1.684

Hermansyah, Y., & Zaus, M. A. (2025). Rancang bangun media pembelajaran interaktif berbasis augmented reality pada mata pelajaran dasar dasar teknik elektronika, *3*(5), 1–11. https://doi.org/10.61132/jupiter.v3i5.1046

Juliani, R., & Ibrahim, N. (2023). Pengaruh media flipbook terhadap hasil belajar bahasa indonesia siswa kelas IV di sekolah dasar. *ELSE (Elementary School Education Journal)*, *7*(1), 20–26. https://doi.org/10.30651/else.v7i1.14065

Kamaruddin, I., Sujarot, Septiani, V., Handayani, E. S., Muhammadong, & Kesek, M. N. (2023). Peran guru dalam pembentukan karakter peserta didik. *Journal of Education and Instruction (JOEAI)*, *7*(2), 16460–16465. https://doi.org/10.31539/joeai.v6i1.5696

Karopak, J., Yunus, M., & Hamid, S. (2023). *Model Desain Kelas & Proses Belajar Mengajar*. Makassar: Pustaka Indonesia.

Koç, A., & Kanadlı, S. (2025). Effect of interactive learning environments on learning outcomes in science education: a network meta-analysis. *Journal of Science Education and Technology*, *34*(4), 681–703. https://doi.org/10.1007/s10956-025-10202-7

Kumalasari, E., & Widodo, S. T. (2025). Keefektifan model pbl berbantuan media canva terhadap hasil belajar pendidikan pancasila peserta didik kelas IV sekolah dasar. *Jurnal Gentala Pendidikan Dasar, 10*(1), 54–68. https://online-journal.unja.ac.id/gentala/article/view/42344

Magay, D., Relmasira, S. C., & Sanoto, H. (2025). Inovasi pembelajaran abad 21 di indonesia: analisis praktik, peluang, dan tantangan. *Indonesian Journal on Education (IJoEd)*, *2*(1), 89-93. https://doi.org/10.70437/sj6w3s05

Mahardika, I. K., Handono, S., Ernasari, Rofida, H. A., Zahro, F., & Seftiyani, M. A. (2023). Hakikat fisika sebagai pilar kehidupan. *Jurnal Pendidikan Ilmiah Transformatif*, *7*(12), 30–34. https://edu.ojs.co.id/index.php/jpit/article/view/103

Masithoh, A. (2022). Pengaruh model pembelajaran jigsaw menggunakan media flipbook terhadap hasil belajar IPS kelas V SD. *Jurnal BELAINDIKA (Pembelajaran Dan Inovasi Pendidikan)*, *4*(1), 21–27. https://doi.org/10.52005/belaindika.v4i1.80

Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review*, *36*(1), 1–25. https://doi.org/10.1007/s10648-023-09842-1

Milala, H. F., Endryansyah, E., Joko, J., & Agung, A. I. (2021). Keefektifan dan kepraktisan media pembelajaran menggunakan adobe flash player. *Jurnal Pendidikan Teknik Elektro*, *11*(02), 195–202. https://doi.org/10.26740/jpte.v11n02.p195-202

Mutmainna, M., M, M., & Kadir, M. R. (2022). Pengembangan media flipbook dalam pembelajaran fisika. *Phydagogic : Jurnal Fisika dan Pembelajarannya*, *5*(1), 56–65. https://doi.org/10.31605/phy.v5i1.1730

Narpilla, S. D., Ramadhani, A. D., & Lubis, H. S. (2025). Analisis kesulitan belajar mahasiswa dalam mengerjakan pada materi kalkulus vektor. *Jurnal Intelek dan Cendikiawan Nusantara, 2*(3), 1924-1933.

Natasya, F. A. (2025). Pembelajaran teks deskripsi menggunakan media flipbook pada kelas vii smp unit daerah kerja pembangunan kedamean. *Bapala, 12*(2), 597–609. https://ejournal.unesa.ac.id/index.php/bapala/article/view/72331

Ningsih, F. S., & Ulya, H. K. (2024). Pemanfaatan e-book sebagai sumber belajar pada kurikulum merdeka. *Revorma: Jurnal Pendidikan dan Pemikiran*, *4*(1), 45–53. https://doi.org/10.62825/revorma.v4i1.98

Pagarra, H., Syawaluddin, A., Krismanto, W., & Sayidiman. (2022). *Media pembelajaran*. Badan Makassar: Penerbit UNM.

Purnomo, P. E. A., Agustini, K., & Sudatha, I. G. W. (2024). Peran flipbook sebagai media pembelajaran inovatif dalam pembelajaran abad 21. *Jurnal Riset dan Inovasi Pembelajaran*, *4*(3), 2001–2015. https://doi.org/10.51574/jrip.v4i3.2286

Rahmadila, A. S., Putri, A. A., Negari, B. D., Shofi, N. A., & Salsabila, R. (2023). Sistem pembelajaran abad-21 sebagai upaya peningkatan sumber daya manusia. *Prosiding Konferensi Nasional Pendidikan Inovatif*, *1*(1), 72–81. https://prokonpi.uinsa.ac.id/index.php/prokonpi/article/view/6/8

Rahman, A., Munandar, S. A., Fitriani, A., Karlina, Y., & Yumriani. (2022). Pengertian Pendidikan, ilmu pendidikan dan unsur-unsur pendidikan. *Al Urwatul Wutsqa: Kajian Pendidikan Islam*, *2*(1), 1–8. https://journal.unismuh.ac.id/index.php/alurwatul/article/view/7757

Riawan, M. R. I., Sukamto, S., & Subekti, E. E. (2020). Keefektifan media pembelajaran buku aktivitas peta si pintar dalam meningkatkan motivasi belajar siswa. *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: E-Saintika*, *4*(2), 95. https://doi.org/10.36312/e-saintika.v4i2.193

Ruanda, R., Purnomo Susanto, H., Qudsiyah Pendidikan Matematika, K., & PGRI Pacitan, S. (2025). Implementasi media pembelajaran e-flipbook pada materi vektor kelas X SMK. *Jurnal Edumatic: Jurnal Pendidikan Matematika, 6(1). https://doi.org/10.21137/edumatic.v6i1.1424*

Salsabilah, M. D., Agustina, I., Astuti, D., & Andayanti, W. (2024). *P*engembangan media pembelajaran flipbook berbasis project based learning pada tema energi terbarukan. *SINASIS, 5*(1), 103–109. https://proceeding.unindra.ac.id/index.php/sinasis/article/view/7903

Suryaningrat, R. R., Basrowi, B., & Rahmadani, K. (2023). Pengembangan media pembelajaran interaktif pada pembelajaran ipa berbasis website di SMPN 6 Cilegon. *Jurnal Pti (Pendidikan dan Teknologi Informasi)*, *10*(2), 62–68. https://doi.org/10.35134/jpti.v10i2.175

Susanti, S., Aminah, F., Assa'idah, M. ., Aulia Wati, M., & Angelika, T. (2024). Dampak negatif metode pengajaran monoton terhadap motivasi belajar siswa. *Pedagogik: Jurnal Pendidikan Dan Riset, 2*(2), 86–93. https://ejournal.edutechjaya.com/index.php/pedagogik/article/view/529/407

Wibowo, E., & Pratiwi, D. D. (2018). Pengembangan bahan ajar menggunakan aplikasi kvisoft flipbook maker materi himpunan. *Desimal: Jurnal Matematika*, *1*(2), 147–156. https://doi.org/10.24042/djm.v1i2.2279

Yuniarrahmana, S., Matsun, M., & Hakim, S. L. (2021). Pengembangan media pembelajaran flipbook digital fisika untuk siswa kelas x pada materi usaha dan energi SMA Negeri 1 Matan Hilir Utara. *Prisma Fisika*, *9*(3), 213. https://doi.org/10.26418/pf.v9i3.50073

Yusuf, R. R., Abdjul, T., & Payu, C. S. (2023). Validitas, kepraktisan, dan efektivitas bahan ajar berbantuan google sites pada materi getaran, gelombang dan bunyi. *Ideas: Jurnal Pendidikan, Sosial, dan Budaya*, *9*(1), 199. https://doi.org/10.32884/ideas.v9i1.1115