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# Developing a Flipping Book-Based E-Book to Enhance Learning Outcomes in Basic Skin Care for Vocational Education

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**Abstract**

The increasing demand for digital integration in vocational education requires innovative learning media that enhance engagement and achievement. This study aimed to develop a Flipping Book-based e-book as an interactive learning tool for the Basic Skin Care course in vocational high school settings. Utilizing a Research and Development (R&D) approach with the ADDIE model, the study involved 60 tenth-grade students divided into experimental and control groups. Validation results by material and media experts showed high feasibility, with average validity scores of 0.924 and 0.935, respectively. Practicality testing also indicated excellent usability, with a practicality score of 93%. Effectiveness was tested through an independent sample t-test, revealing a significant improvement in the experimental group compared to the control group ($p < 0.05$). The N-Gain analysis showed a moderate learning improvement (0.61) for the experimental group and a low improvement (0.15) for the control group. These findings confirm that the Flipping Book-based e-book effectively enhances student learning outcomes in vocational education, particularly skill-oriented courses like Basic Skin Care. Future research is recommended to expand the application of similar interactive e-learning innovations across other vocational disciplines.

**Keywords**: flipping book-based e-book, digital learning media, basic skin care, vocational education, learning outcomes

## INTRODUCTION

The rapid advancement of digital technology over the past two decades has significantly reshaped the educational landscape worldwide (Wang et al, 2024; Makda, 2024). In particular, the integration of technology into teaching and learning processes has become a critical necessity rather than an option (Abedi E A, 2024; Mhlanga, D, 2024). The implementation of digital learning media offers opportunities for more interactive, flexible, and student-centre educational experiences (Otto et al., 2024; Najjar et al., 2025). The transformation from traditional teaching methods to digital platforms is driven by the need to foster 21st-century skills such as digital literacy, critical thinking, creativity, and collaborative problem-solving (Oyedotun, T D, 2024). In vocational education, where practical skills and applied knowledge are emphasized, the integration of innovative digital media is even more crucial (Sharma et al., 2025; Habib et al., 2025). Vocational students require not only theoretical knowledge but also mastery of practical skills that are best acquired through experiential and interactive learning environments (Mayombe, 2024). However, despite technological advancements, many vocational schools, particularly in developing countries, continue to rely heavily on conventional printed materials and teacher-centerer instructional models. This reliance often limits students' opportunities to engage actively with learning content, practice their skills independently, and develop competencies aligned with industry demands (Bhardwaj et al., 2025).

The field of beauty education, especially courses such as Basic Skin Care, demands a pedagogical approach that combines theoretical concepts with visual demonstrations and hands-on practice. Traditional textbooks alone are insufficient to meet these instructional needs effectively. Students in beauty programs benefit from dynamic visualizations, procedural demonstrations, and interactive materials that simulate real-world practices. Recent studies emphasize that integrating dynamic visualizations, procedural

demonstrations, and interactive digital media into learning environments significantly enhances students' understanding and mastery of practical skills, providing immersive and intuitive learning experiences that closely simulate real-world practices (Chen et al., 2025). Recent research highlights that integrating immersive technologies, such as virtual reality, into educational environments enhances students' engagement and learning outcomes by providing dynamic visualizations, procedural simulations, and interactive experiences that closely mirror real-world practices (Li, Nasri, & Norman, 2025). Thus, integrating technology-enhanced learning resources, such as interactive e-books, can bridge the gap between theoretical understanding and practical application (Dahlan et al., 2024). Recent studies affirm that integrating technology-enhanced learning resources, such as interactive e-books, supports the effective bridging of theoretical knowledge and practical application by offering multimodal, interactive, and context-rich environments that enhance student engagement and skill development (Hasumi & Chiu, 2024).

FlippingBook technology emerges as a promising tool to address these needs. FlippingBook transforms static PDFs into interactive, page-flipping digital publications that can incorporate multimedia elements, including videos, animations, hyperlinks, and interactive quizzes. Unlike traditional e-books, FlippingBook-based e-books offer a more engaging and immersive learning experience, resembling the familiarity of reading physical books while providing the added value of digital interactivity. Such features are particularly advantageous for vocational students learning complex practical procedures, as they allow for richer content delivery and easier comprehension (Erfiana & Rohmah 2025). Previous research has indicated the benefits of using interactive e-books in enhancing students' motivation, engagement, and independent learning skills (Tlili et al, 2024; Shao et al, 2025). The use of Flip PDF Professional-based e-books significantly improved students' learning autonomy and interest in learning activities (Julian & Miaz, 2024). The flipbook media contribute to the modernization of learning processes, fostering greater student participation and improving learning outcomes (Zakharova et al, 2024). However, the application of FlippingBook-based e-books specifically in vocational beauty education remains underexplored. Most existing studies focus on general education contexts, leaving a gap in understanding how such technologies can be tailored to meet the unique needs of vocational training, particularly in skill-intensive fields like cosmetology and skincare.

In addition to the limited exploration of FlippingBook in vocational beauty education, there is also a lack of empirical evidence regarding the effectiveness of such media in improving learning outcomes compared to conventional methods. While theoretical arguments support the potential advantages of digital interactive media, rigorous experimental studies assessing their actual impact on student achievement are still scarce. This research gap necessitates the development and empirical validation of FlippingBook-based e-books tailored to the instructional requirements of vocational beauty courses. Moreover, considering the increasing emphasis on Industry 4.0 and Education 4.0 paradigms, vocational education institutions are expected to produce graduates who are digitally literate, adaptable, and capable of continuous learning. Interactive e-books that simulate real-world tasks and provide immediate feedback align with these expectations by promoting active learning, critical thinking, and self-directed learning among students. Therefore, developing and implementing FlippingBook-based e-books in vocational education is not only timely but also strategically aligned with broader educational transformation goals.

This study was initiated in response to these observed needs and gaps. Preliminary observations at SMK Negeri 1 Pekalongan revealed that students in the Basic Skin Care course primarily relied on printed textbooks, with minimal exposure to digital learning resources. Teachers expressed challenges in delivering practical content effectively and engaging students in independent practice outside the classroom. The lack of interactive learning media hindered students' ability to visualize and perform skincare procedures accurately, potentially affecting their overall competency development.

Recognizing these challenges, this study aimed to develop a FlippingBook-based e-book as an alternative learning medium for the Basic Skin Care course. The development process followed the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model, which is widely recognized in instructional design for its systematic and iterative approach to creating effective educational interventions (Alodwan, 2018; Sugiyono, 2017). The e-book was designed to include comprehensive textual explanations, step-by-step procedural images, embedded tutorial videos, and interactive quizzes to reinforce learning. The study sought to evaluate three main aspects of the developed e-book: its validity, practicality, and effectiveness. Validation was conducted by material and media experts to ensure the content's accuracy, appropriateness, and instructional quality. Practicality was assessed based on user feedback from both students and teachers regarding the ease of use, interface design, and overall user experience. Effectiveness was measured by comparing the learning outcomes of students using the FlippingBook-based e-book (experimental group) with those using conventional printed textbooks (control group) through pre-test and post-test analyses, including N-Gain calculations and independent sample t-tests.

By addressing these objectives, this research contributes to the growing body of knowledge on the integration of interactive digital media in vocational education. Specifically, it offers empirical evidence on

the benefits of FlippingBook-based e-books in improving students' learning outcomes in beauty education. The findings are expected to inform educators, curriculum developers, and policymakers about the potential of such innovations to enhance teaching and learning practices in vocational schools. Furthermore, this study emphasizes the importance of aligning instructional media development with the specific needs of vocational learners. Unlike general education students, vocational students require learning resources that are highly contextualized, visually rich, and practically oriented. The success of educational technologies in vocational settings depends not only on technological sophistication but also on pedagogical relevance and user-centered design.

In conclusion, the development and evaluation of a FlippingBook-based e-book for the Basic Skin Care course address critical gaps in vocational education research and practice. It responds to the pressing need for innovative, effective, and engaging learning media that can better prepare vocational students for the demands of the modern workforce. Through this study, it is anticipated that vocational education, particularly in beauty-related fields, will be better positioned to leverage digital technologies for more meaningful and impactful learning experiences.

## METHOD

### Research Design

This study employed a quasi-experimental research design with a pre-test and post-test control group approach. The design aimed to examine the development, validation, practicality, and effectiveness of a FlippingBook-based e-book as a digital learning medium for the Basic Skin Care course in vocational education. The study involved two groups: an experimental group that used the developed FlippingBook-based e-book and a control group that utilized conventional printed textbooks.

### Participants

Participants were 60 tenth-grade students enrolled in the Basic Skin Care course at a state vocational high school in Pekalongan, Indonesia. Participants were randomly assigned to two groups, with 30 students in the experimental group and 30 students in the control group. The participants had comparable demographic backgrounds and prior academic achievements, ensuring initial equivalence between groups.

### Development Procedure

The development of the FlippingBook-based e-book followed the ADDIE instructional design model, comprising five phases: Analysis, Design, Development, Implementation, and Evaluation. In the Analysis phase, the learning needs and characteristics of the Basic Skin Care course were identified through interviews with subject teachers and curriculum analysis. The Design phase involved the formulation of learning objectives, storyboard creation, and multimedia integration planning. During the Development phase, the FlippingBook-based e-book was created, embedding text, procedural images, tutorial videos, and interactive quizzes. The Implementation phase involved deploying the e-book in the experimental class, while the Evaluation phase assessed the product's validity, practicality, and effectiveness.

### Measures

### Validation

Validation was conducted by two media experts and two subject matter experts. They assessed the content accuracy, instructional quality, media design, and usability of the e-book using a standardized validation instrument. Each item was rated on a 5-point Likert scale ranging from 1 (very poor) to 5 (very good).

### Practicality

Practicality was measured based on user feedback collected through questionnaires administered to students and teachers after using the e-book. The questionnaire evaluated aspects such as ease of navigation, attractiveness of design, clarity of information, and overall user satisfaction.

### Effectiveness

Effectiveness was assessed through students' learning outcomes. Pre-tests and post-tests were administered to both the experimental and control groups. The tests consisted of multiple-choice questions designed to measure knowledge and understanding of basic skin care procedures. Learning gain was calculated using the normalized gain (N-Gain) formula, and an independent sample t-test was conducted to determine the significance of the differences between groups.

**Instruments**

To ensure comprehensive data collection and analysis, a variety of research instruments were utilized in this study, each tailored to measure specific aspects of the research objectives.

The study utilized several instruments, including:

- Validation sheets for expert evaluation of the e-book.
- Practicality questionnaires for students and teachers.
- Pre-test and post-test assessments consisting of 25 multiple-choice questions covering theoretical and practical aspects of basic skin care.

All instruments were validated for content and reliability prior to use.

**Ethical Considerations**

The study adhered to ethical research practices. Informed consent was obtained from all participating students and their guardians. Participants were informed about the study's objectives, the voluntary nature of participation, and their right to withdraw at any time. Confidentiality and anonymity of participant data were maintained throughout the research process.

**Procedure**

Prior to the intervention, both groups completed the pre-test to assess baseline knowledge. The experimental group then used the FlippingBook-based e-book during four consecutive learning sessions, while the control group continued using the printed textbooks. At the end of the intervention, all participants completed the post-test. Students and teachers from the experimental group also completed the practicality questionnaire.

**Data Analysis**

Descriptive statistics were used to analyze validation and practicality scores. The effectiveness of the e-book was analyzed using normalized gain (N-Gain) scores to measure learning improvement, and an independent samples t-test was conducted to compare the post-test scores between the experimental and control groups. Statistical analyses were performed using SPSS version 26, with significance levels set at $p < 0.05$.

## RESULT AND DISCUSSION

### Result

### Validity of the FlippingBook-Based E-Book

To ensure the instructional quality of the developed FlippingBook-based e-book, a validation process was conducted by two subject matter experts and two media design experts. This validation focused on the content relevance, instructional effectiveness, multimedia design, and overall usability. The results of the validation process are presented in **Table 1**.

Table 1. Summary of Validation Scores

| Aspect Evaluated | Average Score |
|---|---|
| Content Validity | 0.924 |
| Media Validity | 0.935 |

As shown in **Table 1**, the FlippingBook-based e-book achieved high validity scores. Experts highlighted the strength of the e-book in delivering clear procedural steps and supporting multimedia elements such as embedded videos and interactive quizzes. Minor suggestions, including adjustments to navigation flow and video timing, were incorporated to enhance user experience before implementation.

### Practicality of the FlippingBook-Based E-Book

After validating the content and media quality, the practicality of the e-book was assessed through questionnaires administered to students and teachers after its implementation in the learning process. The practicality assessment results are displayed in **Table 2**.

Table 2. Practicality Test Results

| Respondent Group | Practicality Score (%) |
|---|---|
| Students | 93% |
| Teachers | 92% |

Based on **Table 2**, both students and teachers reported a very high practicality score for the FlippingBook-based e-book. Students praised the navigation ease and interactive design, while teachers noted that the e-book supported independent learning and reduced the need for repetitive instruction.

**Observation Results**

To observe students' behavior during the learning process with the e-book, an observation sheet was used focusing on aspects such as attention, participation, procedural accuracy, collaboration, and task independence. The summarized observation results are shown in **Table 3**.

Table 3. Observation Sheet Results

| Indicator | Percentage of Achievement (%) |
|---|---|
| Attention to material | 95% |
| Active participation during learning | 92% |
| Ability to follow procedures correctly | 90% |
| Collaboration with peers | 88% |
| Independence in completing tasks | 89% |

As indicated in **Table 3**, students showed strong engagement across all observed aspects. The interactive multimedia features within the FlippingBook-based e-book appeared to stimulate both individual focus and collaborative learning activities.

**Effectiveness of the FlippingBook-Based E-Book**

The effectiveness of the e-book was evaluated through pre-test and post-test comparisons between the experimental group (using the e-book) and the control group (using traditional textbooks). The descriptive statistics for pre-test and post-test scores are shown in **Table 4**.

Table 4. Pre-test and Post-test Scores

| Group | Pre-test Mean | Post-test Mean |
|---|---|---|
| Experimental | 60.23 | 86.53 |
| Control | 59.73 | 68.46 |

According to **Table 4**, prior to the intervention, the mean pre-test scores of both groups were relatively similar. After using the FlippingBook-based e-book, the experimental group demonstrated a considerable improvement in post-test scores compared to the control group.

To further evaluate learning gains, normalized gain (N-Gain) scores were calculated, as presented in **Table 5**.

Table 5. N-Gain Scores

| Group | N-Gain Category | N-Gain Value |
|---|---|---|
| Experimental | Moderate | 0.61 |
| Control | Low | 0.15 |

As seen in **Table 5**, the experimental group achieved a moderate N-Gain value (0.61), while the control group's N-Gain remained in the low category (0.15).

The distribution of students based on their N-Gain categories is presented in **Table 6**.

Table 6. Distribution of N-Gain Categories

| Group | High (%) | Moderate (%) | Low (%) |
|---|---|---|---|
| Experimental | 23.33 | 76.67 | 0 |
| Control | 0 | 20 | 80 |

Referring to **Table 6**, it is evident that 100% of the experimental group students achieved moderate to high gains, whereas the majority of control group students remained in the low category.

To statistically test the differences, independent sample t-tests were performed for both pre-test and post-test scores. The pre-test t-test results are summarized in **Table 7**.

Table 7. Independent Sample t-Test Pre-test Results

| Group | N | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|
| Experimental | 30 | 60.23 | 6.15 | 0.312 | 0.756 |
| Control | 30 | 59.73 | 5.98 | | |

As shown in **Table 7**, there was no significant difference between the experimental and control groups on the pre-test scores ($p > 0.05$), indicating that both groups started with similar baseline knowledge.

The post-test t-test results are presented in **Table 8**.

Table 8. Independent Sample t-Test Post-test Results

| Group | N | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|
| Experimental | 30 | 86.53 | 5.89 | 7.213 | 0.000 |
| Control | 30 | 68.46 | 6.35 | | |

Based on **Table 8**, a statistically significant difference ($p < 0.05$) was found between the experimental and control groups, confirming the effectiveness of the FlippingBook-based e-book in improving learning outcomes.

The improvement in learning outcomes between pre-test and post-test scores for both groups is visually illustrated in the following chart (**Figure 1**). The chart compares the average pre-test and post-test scores of the experimental group, which utilized the FlippingBook-based e-book, and the control group, which relied on conventional printed textbooks.

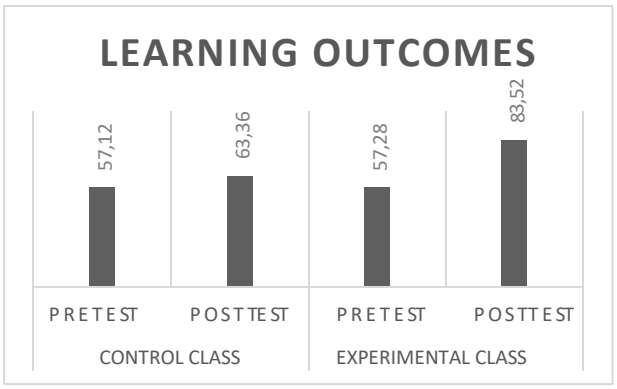


Figure 1. Learning Outcomes Improvement Chart

As depicted in **Figure 1**, both groups experienced an increase in mean scores from pre-test to post-test. However, the experimental group showed a substantially greater improvement compared to the control group. The experimental group's mean score increased by 26.3 points (from 60.23 to 86.53), while the control group only increased by 8.73 points (from 59.73 to 68.46). This significant difference in score improvements reflects the positive impact of integrating interactive multimedia elements through the FlippingBook-based e-book. The chart clearly demonstrates that students exposed to the interactive e-book not only achieved higher final performance but also experienced a steeper growth trajectory in their learning outcomes compared to students who used traditional learning materials. This visual evidence supports the statistical findings presented in the previous tables and strengthens the conclusion regarding the effectiveness of the developed learning media.

The appearance of the FlippingBook developed in this study is shown in Figure 2


Figur 2. FIippingBook

Figure 2 show the FlippingBook consists of 18 pages covering various topics related to Basic Facial Skin Care for beauty students. It is equipped with supporting videos to facilitate students' understanding of the material and assist them in applying it in real-life practice. Additionally, the FlippingBook enhances accessibility and increases student interest through its attractive design. Students can easily access the materials anytime and anywhere using their smartphones.

## DISCUSSION

The high validity scores achieved by the FlippingBook-based e-book confirm that the material and media components are aligned with pedagogical standards and user expectations. The rigorous validation process by content and media experts ensured that the instructional materials were not only accurate but also engaging and accessible. This finding is consistent with previous studies emphasizing the necessity of clear, relevant, and context-appropriate content in maximizing the impact of digital learning media (Naseer et al, 2025).

The practicality findings, with student and teacher satisfaction levels exceeding 90%, suggest that the e-book was well-received and suitable for vocational education settings. Students' positive experiences with the e-book indicate that interactive features such as embedded videos, quizzes, and clear navigational structures contributed to ease of learning and motivation. These results support prior research by Al-Busaidi et al (2025), who found that digital learning tools enhance engagement and foster active participation among vocational students. Importantly, practicality is a critical factor in vocational education, where learners often require immediate, actionable knowledge and the ability to self-direct their learning in practical contexts.

Observation results further reinforce the e-book's effectiveness in promoting active learning. High levels of student attention, participation, and independence suggest that the interactive design of the e-book successfully stimulated cognitive and psychomotor engagement. This is vital in vocational education, where the development of practical skills alongside theoretical understanding is paramount (Fantinelli S et al, 2024; Hermans, S, 2024; Apriyani & Ayuningrum, 2024). The findings align with constructivist learning theories, which posit that learners construct knowledge more effectively when actively involved in meaningful activities (Sudana et al, 2019 dan Lee et al, 2024). The significant improvements in learning outcomes, as evidenced by the t-test and N-Gain results, provide strong empirical support for the effectiveness of the FlippingBook-based e-book. The experimental group outperformed the control group significantly in the post-test scores, demonstrating that interactive, multimedia-enriched learning environments can substantially enhance vocational students' academic achievement. These outcomes are in line with Mayer (2024) Cognitive Theory of Multimedia Learning, which argues that learning is improved when verbal and visual information are integrated effectively.

Moreover, the findings have important implications for the ongoing digital transformation of vocational education. The success of the FlippingBook-based e-book highlights how well-designed digital tools can bridge the gap between theoretical knowledge and practical skill acquisition, preparing students for the demands of the Industry 4.0 workplace, where digital literacy and the ability to adapt to technology-enhanced environments are critical. However, the study also revealed challenges. Despite the advantages of multimedia learning tools, a subset of students continued to struggle with complex procedural tasks. This suggests that while e-books can enhance cognitive understanding, they cannot entirely replace the need for

hands-on practice and direct mentorship, especially in skill-intensive disciplines such as skin care. Future instructional designs should therefore consider hybrid models that integrate digital learning tools with practical, experiential learning opportunities.

Comparing these findings to previous literature, it becomes evident that while many studies have highlighted the benefits of e-learning in general education contexts, there remains a scarcity of research specifically addressing vocational beauty education. This study contributes to filling that gap by providing empirical evidence of how interactive e-books can be effectively deployed in vocational settings to improve both theoretical knowledge and practical competencies. From a broader perspective, the successful implementation of the FlippingBook-based e-book demonstrates the critical importance of adopting systematic instructional design models like ADDIE in developing educational technology products. Careful analysis, iterative design, and validation processes are key to ensuring that the final product meets learners' needs and educational objectives. Finally, the study's limitations must be acknowledged. The use of a single school as the study site may limit the generalizability of the findings. Additionally, the relatively short duration of the intervention may not capture the long-term retention effects of using the e-book. Future research should involve larger, more diverse samples and extend the duration of interventions to examine sustained impacts. Exploring the integration of emerging technologies such as virtual reality (VR) and artificial intelligence (AI) into vocational e-learning environments also represents a promising direction for further inquiry.

## CONCLUSION

This study successfully developed and evaluated a FlippingBook-based e-book to enhance learning outcomes in the Basic Skin Care course within vocational education. The e-book demonstrated high validity, confirming its alignment with pedagogical and media standards. Practicality assessments showed strong acceptance from students and teachers, highlighting the e-book's user-friendly navigation, multimedia integration, and positive impact on independent learning. Observational data indicated high levels of student engagement, participation, and independence during learning sessions, reinforcing the e-book's effectiveness in promoting active and skills-oriented learning. Effectiveness analysis further showed that students using the e-book achieved significantly higher post-test scores and greater learning gains compared to those relying on traditional printed materials.

The study's findings affirm the potential of interactive e-books to bridge theoretical knowledge and practical skill acquisition, supporting the modernization of vocational education in response to Industry 4.0 demands. By combining multimedia elements with instructional design principles, the FlippingBook-based e-book fostered deeper cognitive processing, improved learning retention, and enhanced student autonomy. Despite these promising results, the study has limitations, including a limited sample from a single vocational school and a relatively short intervention period. Future research should involve larger, more diverse populations and assess long-term retention effects. Integrating emerging technologies such as augmented reality (AR) or virtual reality (VR) could further enrich digital learning environments.

In practical terms, vocational education institutions are encouraged to invest in the development and adoption of tailored digital learning media. Teacher training programs should also incorporate strategies for effectively integrating such technologies into the curriculum. Overall, the FlippingBook-based e-book developed in this study demonstrates a promising approach to enhancing vocational students' learning outcomes, preparing them for a rapidly evolving digital workforce.

## CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest regarding the publication of this paper. The research was conducted independently without any financial, commercial, or personal relationships that could be construed as a potential conflict of interest.

## ETHICAL STATEMENT

This study was conducted in accordance with ethical standards for research involving human participants. Informed consent was obtained from all participants and their guardians prior to data collection. Participation was voluntary, and confidentiality and anonymity of all participants were assured. The research protocol was approved by the institutional authority of the vocational school where the study was conducted.

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