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Interactive E-Flipbook as Digital Learning Innovation in Project-Based Craft Education

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Abstract
The integration of digital media into project-based learning has become increasingly important in supporting creative skill development in secondary education. However, the availability of structured and validated digital learning resources for craft subjects remains limited. This study aimed to develop and validate an e-flipbook learning medium for tote bag painting within project-based craft classes. The research employed a Research and Development (R&D) approach using the ADDIE model, limited to the analysis, design, and development stages. The feasibility of the developed product was evaluated through expert validation using the Content Validity Index (CVI). The validators consisted of three media experts and three subject-matter experts. The results indicated that the media component achieved an S-CVI/Ave value of 0.95 and an S-CVI/UA value of 0.85, both categorized as highly feasible. Meanwhile, the material component obtained an S-CVI/Ave value of 0.90 (very feasible category) and an S-CVI/UA value of 0.69 (feasible category). These findings demonstrate that the developed e-flipbook meets the required content validity standards in both media and material aspects. Therefore, the e-flipbook can serve as a validated digital learning alternative to support project-based craft instruction in secondary education.

Keywords: e-flipbook, digital learning, crafts subject, feasibility test

INTRODUCTION

The learning process involves not only knowledge transfer but also the formation of attitudes and planned behaviour that influence students' competencies and performance (Faizah Kamal, 2024; Jannah et al., 2025). To support effective learning outcomes, the use of appropriate instructional media is essential. Interactive and digital learning media have become increasingly important in creating engaging, student-centred, and meaningful learning environments. Learning media facilitate clearer content delivery, enhance classroom interaction, and improve students' focus and participation (Harsiwi & Arini, 2020; Trisiana, 2020).

With rapid technological advancement, digital learning tools such as e-flipbooks have gained attention as innovative instructional resources. E-flipbooks allow structured content presentation enriched with multimedia elements, fostering autonomous learning and increasing student motivation (Khotimah et al., 2023; Virdarani, 2023). Previous studies indicate that digital learning media positively influence students' engagement, critical thinking skills, and academic achievement compared to conventional instructional methods (Febriani, 2025; Prasasti & Anas, 2023; Rumawatine, 2025).

The need for innovative learning media is particularly relevant in craft education at the secondary level, where project-based learning (PBL) is widely implemented to develop creativity, practical skills, and independent learning attitudes (Jihan Zalika Rachman & Siska Maulidya, 2024; Sapitriani Tino et al., 2024). Craft subjects require instructional materials that present procedural content systematically while supporting hands-on activities. However, digital learning resources specifically designed for practical craft instruction remain limited. At SMA Negeri 9 Semarang, learning media are still predominantly based on

printed student worksheets (LKS), which provide limited interactivity and visual engagement.

Although prior research has demonstrated the effectiveness of e-modules and e-flipbooks in theoretical subjects such as science and mathematics (Awwaliyah et al., 2021; Silvia Oksa & Soenarto, 2020), studies focusing on their development and validation in practical craft education are still scarce. This gap highlights the need to design and validate structured digital learning media that align with the characteristics of project-based craft instruction.

Therefore, this study aims to develop and evaluate an interactive e-flipbook learning medium for tote bag painting within project-based craft classes at SMA Negeri 9 Semarang. The feasibility assessment focuses on both media design and material aspects to ensure content validity and instructional suitability. The findings are expected to contribute to the development of validated digital learning resources and provide a reference for integrating interactive media into practical, project-based craft education in line with 21st-century learning demands.

METHOD

This study employs a Research and Development (R&D) approach aimed at producing and validating an e-flipbook learning medium prior to its implementation in classroom instruction. The development process follows the ADDIE model—Analysis, Design, Development, Implementation, and Evaluation (Irawati & Setyadi, 2021). However, this research is limited to the Analysis, Design, and Development stages, as the primary objective is to develop the product and assess its feasibility through expert validation.

The analysis stage was conducted to identify instructional needs, learner characteristics, and the suitability of tote bag painting material within project-based craft learning. The findings from this stage informed the determination of learning objectives and media specifications. The design stage involved the preparation of instructional content, formulation of learning objectives, structuring of project-based activities, and visual interface planning for the e-flipbook. At this stage, a feasibility assessment instrument was also developed. The development stage focused on transforming the design blueprint into a functional e-flipbook product, which was subsequently subjected to expert validation to determine its suitability and identify areas for refinement.

The feasibility assessment instrument was adapted from established instruments in previous studies. The media evaluation instrument covered aspects of visual design, navigation, interactivity, and technical quality (Akbar et al., 2024), while the material evaluation instrument assessed learning objectives alignment, instructional planning, content accuracy, and evaluation components (Yudiatmoko et al., 2024).

Data analysis employed a quantitative descriptive approach to interpret expert validation results (Rojali et al., 2021). The Content Validity Index (CVI) method was used, including both the Item Content Validity Index (I-CVI) and the Scale Content Validity Index (S-CVI). The I-CVI was calculated by dividing the number of experts rating an item as relevant by the total number of experts (Jamin et al., 2022). The S-CVI was then calculated and converted into a percentage (S-CVI × 100%) to facilitate interpretation. Feasibility categories were determined based on the following criteria:

Table 1Interpretation of Feasibility

Percentage	Feasibility Category
81–100%	Very Feasible
61–80%	Feasible
41–60%	Moderately Feasible
21–40%	Less Feasible
0–20%	Not Feasible

(El-Adly & Arianingsih, 2022; Sugiyono, 2020)

RESULTS AND DISCUSSION

The development of the e-flipbook learning media was conducted using a Research and

Development (R&D) approach based on the ADDIE model, limited to the Analysis, Design, and Development stages. This limitation was applied because the study focused on product development and feasibility testing through expert validation rather than classroom implementation.

During the analysis stage, a needs assessment revealed that learning at SMA Negeri 9 Semarang remains predominantly reliant on printed student worksheets (LKS), resulting in limited integration of digital learning media. This condition restricts interactivity and reduces opportunities for visually enriched instruction, particularly in practical craft subjects. The findings indicate the need for visually engaging, interactive, and easily accessible digital learning media to better support students' understanding and project-based learning activities.

In the design stage, the e-flipbook was systematically planned by aligning learning outcomes, instructional objectives, and tote bag painting material within a project-based learning framework. The media design incorporated structured content organization, visual layout planning, intuitive navigation, interactive elements, and technical usability considerations to ensure clarity and user-friendliness. The design aimed to enhance student engagement and support active participation in practical learning.

The development stage involved transforming the design blueprint into a functional e-flipbook accessible through electronic devices such as laptops, smartphones, and tablets. The final product integrated multimedia elements and navigational features that facilitate flexible access to subtopics and learning activities. Subsequently, the developed e-flipbook underwent feasibility testing through validation by material and media design experts, serving as the basis for product refinement and quality assurance.

Table 2. Recapitulation of Media Aspect CVI Results

Assessment Component	Result	Percentage	Description
Expert 1	19/19	100%	All items rated as relevant
Expert 2	19/19	100%	All items rated as relevant
Expert 3	16/19	84%	Three items rated as not relevant
I-CVI	0.67–1.00	—	Variation of item-level agreement
S-CVI/Ave	0.947	94.7%	Very Feasible
S-CVI/UA	0.842	84.2%	Very Feasible

The media validation results indicate that the developed e-flipbook achieved an S-CVI/Ave value of 0.947 (94.7%) and an S-CVI/UA value of 0.842 (84.2%). Based on the established feasibility criteria, these values place the product within the *very feasible* category. This finding demonstrates that the e-flipbook meets content validity standards across key media aspects, including visual design, navigation, interactivity, and technical quality.

Despite the high feasibility rating, the validators provided several recommendations to enhance the overall quality of the media. These suggestions primarily concerned refinements in visual consistency, interface optimization, and the enhancement of interactive elements to further improve user experience and instructional effectiveness.

Table 3. Recapitulation of Material Aspect CVI Results

Assessment Component	Result	Percentage	Description
Expert 1	9/13	69.2%	Four items rated as not relevant
Expert 2	13/13	100%	All items rated as relevant
Expert 3	13/13	100%	All items rated as relevant
I-CVI	0.67–1.00	—	Variation of item-level agreement
S-CVI/Ave	0.897	89.7%	Very Feasible
S-CVI/UA	0.692	69.2%	Feasible

The material validation results indicate that the developed e-flipbook achieved an S-CVI/Ave score of 0.897 (89.7%) and an S-CVI/UA score of 0.692 (69.2%). Based on the established feasibility criteria, the material aspect falls within the *feasible* category. These findings suggest that the content aligns with the specified learning outcomes, instructional objectives, and student characteristics, although several

refinements were recommended to further enhance material quality and instructional clarity.

Rapid technological advancement continues to drive innovation in learning media to improve student engagement and educational quality (Setiyani et al., 2022). The integration of digital tools in instruction shifts learning from a teacher-centered approach toward a more student-centered and interactive model. The present findings demonstrate that the developed e-flipbook meets high feasibility standards in both media and material aspects, supporting previous studies indicating that e-flipbooks enhance student motivation, flexibility in learning, and comprehension of instructional content (Fuldiaratman et al., 2024; Maulana et al., 2024; Prasasti & Anas, 2023).

Technology-based learning media are also associated with the development of critical thinking skills and the creation of more creative, effective, and efficient learning environments (Erna et al., 2021; Simatupang et al., 2020). Additionally, digital media such as e-flipbooks contribute to environmentally sustainable practices by reducing paper usage without diminishing instructional effectiveness (Leny et al., 2021).

Feasibility of Media Aspects

The visual design aspect achieved a feasibility score of 85%, categorized as *feasible*. This result indicates that the layout organization, color composition, typography, and visual clarity meet instructional standards. Well-structured visual presentation enhances readability and supports students' comprehension and engagement (Herawati & Rahmansyah, 2023; Mulfajril et al., 2023).

The navigation and usability aspect obtained a score of 90%, categorized as *very feasible*. The navigation system was designed consistently, with clear page transitions and intuitive operational features that facilitate efficient access to learning content. Structured navigation is essential in maintaining learner focus and improving usability (Wasito et al., 2022).

The interactivity and attractiveness aspect achieved a score of 68%, categorized as *feasible*. While the media meets fundamental interactivity criteria, validators suggested further enhancement of interactive elements to optimize student engagement. Interactive features play a crucial role in fostering active learning and improving engagement levels (Dewi Nurpitri Resma, 2022; Marpaung, 2025).

The technical aspect obtained a score of 90%, categorized as *very feasible*. This indicates strong compatibility across devices, stable performance, and ease of access. Adequate technical quality ensures that well-designed instructional media can function effectively without usability barriers (Novitasari & Kurniawati, 2023; Sarip et al., 2022).

Feasibility of Material Aspects

The learning outcomes and objectives (CP & TP) aspect achieved a feasibility score of 65%, categorized as *feasible*. Although aligned with curriculum standards, validators recommended improvements in formulation clarity to better guide instructional implementation. Clearly defined learning outcomes serve as a foundation for effective instructional planning and strategy alignment (Hanjar Bait et al., 2025; Wayan Kandia et al., 2023).

The lesson plan component obtained a score of 96%, categorized as *very feasible*. This indicates that the instructional planning is systematic and provides structured guidance for classroom implementation (Seftiyani et al., 2023).

The content quality aspect achieved a score of 81%, categorized as *feasible*. The material was considered coherent, relevant, and structured to support cognitive development and achievement of learning objectives (Hendra et al., 2021).

The learning evaluation component received a score of 94%, categorized as *very feasible*. This suggests that the assessment components are appropriate for measuring student understanding and learning outcomes. Effective evaluation functions as both a reflection tool and a decision-making instrument for improving instructional strategies (A. Rahmaeni M et al., 2025; Ridho, 2018).

Overall, the validation results confirm that the developed e-flipbook meets the required standards of media and material feasibility, with minor refinements recommended to optimize interactivity and clarity of learning objectives. These findings reinforce the role of structured and validated digital media in supporting project-based craft learning in secondary education.

Table 4. Summary of Revisions Based on Expert Validation

A. Material Aspect Revisions	
Before Revision	**After Revision**
Learning outcomes (CP & TP) were not explicitly listed.	Learning outcomes (CP & TP) were clearly formulated and included in the learning section.
The material was incomplete and did not include an explanation of Indonesian Decorative Diversity.	The material was supplemented with a structured explanation of Indonesian Decorative Diversity.
B. Media Aspect Revisions	
Before Revision	**After Revision**
Color usage was overly saturated and visually cluttered.	Color composition was adjusted to improve visual harmony and clarity.
Font size was inappropriate, reducing readability.	Font size and typography were adjusted to enhance readability.
Layout organization was inconsistent and visually disorganized.	Layout structure was reorganized to improve visual balance and consistency.

Table 4 summarizes the revisions made to both material and media aspects based on expert validation. The improvements focused on strengthening instructional clarity, visual organization, and alignment with learning objectives.

In the material aspect, revisions included the explicit formulation of learning outcomes (CP & TP) and the addition of structured content on Indonesian Decorative Diversity. These enhancements ensure stronger alignment between instructional objectives and presented content, thereby improving pedagogical coherence.

In the media aspect, refinements were made to color composition, typography, and layout organization. Adjustments to visual hierarchy, font size, and color balance significantly improved readability and visual clarity. These revisions were implemented to enhance user experience and ensure that the media supports effective student engagement without cognitive overload.

The systematic revision process, guided by expert recommendations, strengthened both the instructional and technical quality of the e-flipbook. Following refinement and re-evaluation, the media was determined to meet established feasibility standards in both material and media dimensions. Overall, the iterative validation and revision process contributed to improving the instructional effectiveness, visual consistency, and usability of the developed e-flipbook as a digital learning innovation for project-based craft education.

CONCLUSION

Based on the results and subsequent discussion, the developed e-flipbook learning resource for tote bag painting in the craft class at SMA Negeri 9 Semarang is considered suitable for instructional use. The media validation results indicate a *very feasible* category, with an S-CVI/Ave value of 0.947 (94.7%) and an S-CVI/UA value of 0.842 (84.2%). Meanwhile, the material validation results fall within the *feasible* category, with an S-CVI/Ave value of 0.897 (89.7%) and an S-CVI/UA value of 0.692 (69.2%). These findings demonstrate that the e-flipbook meets established content validity standards across both media and material dimensions, confirming its appropriateness as a digital learning alternative for project-based craft instruction.

For future development, further research is recommended to enhance the e-flipbook through a Figma-based web design platform to create a more responsive and interactive interface. Additional features, such as integrated access to instructional videos hosted on platforms like YouTube, may further enrich the learning experience. Such developments are expected to improve usability, interactivity, and the overall effectiveness of digital learning resources in supporting 21st-century craft education.

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