



## The Effectiveness of Flipbook-Based Learning Media Using Problem-Based Learning on Students' Interest in UX Design Course

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### Abstract

User Experience Design at the State University of Malang encounters significant challenges in students' grasp of essential concepts such as Design Thinking, User Experience (UX), and User Interface (UI) design, primarily due to the lack of specialized learning resources. This study addresses these challenges by developing a Flipbook-based learning resource integrated with Problem-Based Learning (PBL) strategies, aiming to enhance student engagement and motivation. The research follows the Research and Development (R&D) method, utilizing the ADDIE model, which includes Analyze, Design, Development, Implement, and Evaluate phases. The resulting media, a UX Design flipbook with a .html extension, underwent rigorous validation. Material expert validation achieved a score of 81.90%, while media expert validation scored 87.82%, both categorized as very feasible. Furthermore, small and large group trials yielded very feasible ratings of 86.23% and 87.38%, respectively. The student interest test indicated a high score of 86.30%, reflecting very high student interest. These findings demonstrate that the developed media is well-suited as supplementary material in UX Design education, promoting a more interactive, engaging, and effective learning environment. This innovative approach holds promise for improving student understanding and interest in the UX Design course.

## INTRODUCTION

Education plays a pivotal role in advancing a nation (McCowan, 2019). However, traditional learning methods that rely solely on teachers often fail to actively engage students, leading to suboptimal educational quality (Cholik, 2017). Integrating technology into the curriculum, such as using electronic media and interactive e-modules, can make learning more engaging and effective (Yusril, 2019). The use of media such as flipbooks, which combine animation, video, text, and audio, has been shown to increase students' interest in learning.

Observations and interviews reveal that the lecture-based learning model in the User Experience Design course often results in student boredom and disinterest. The absence of specialized learning media for the core material of this course further hinders students' understanding (Ding & Zhang, 2018). Additionally, students exhibit a high dependency on classroom instruction and lack the initiative to seek additional learning resources independently (Hamdan et al., 2020). The evolution of educational technology also impacts the governance and implementation of lecture activities (Herlambang & Hidayat, 2016). Pixyoriza (2020) indicates that flipbook-based learning media can yield positive outcomes, with student response trial results at 86% and media validation results at 85%.

Therefore, this study aims to develop flipbook-based e-module learning media using the Problem-Based Learning model in the User Experience Design course, assess the feasibility of these learning media, and measure student interest in learning after their implementation (Chen et al., 2024). This approach is expected to make the learning process more interactive, engaging, and effective, thereby enhancing student understanding and interest in learning (Hidayat et al., 2020)(Lv, 2024).

## RESEARCH METHOD

The development model for E-Module learning media based on Flip Book follows the ADDIE model, which consists of five stages: (1) Analyze, to obtain information on needs as a basis for creating learning media (Hidayat et al., 2020). Initial observations were conducted through interviews with lecturers of the User Experience Design course and students from the Informatics Engineering Education program at Malang State University. (2) Design, to plan the creation of learning media in the form of flip books using the Problem-Based Learning (PBL) approach with user experience design material. This includes

designing the layout, selecting multimedia elements, and integrating Problem-Based Learning (PBL) strategies. (3) Development, involving the assembly and combination of all module elements according to the flowchart, wireframe, and concept design related to the arrangement of components in the product. Include developing the flip book's content, incorporating interactive features, and assembling multimedia components according to the design specifications. Prototypes are created and refined based on iterative feedback. (4) Implementation, where the E-module is tested and implemented in learning activities to determine its effectiveness and identify the level of student learning interest after its use. Feedback is collected through observations, student feedback forms, and performance assessments to determine the module's effectiveness in enhancing learning and engagement. (5) Evaluation, conducted by testing throughout the flipbook development process to assess the feasibility of the media, achievement of goals, and student learning interest. The purpose of product testing is to obtain feedback that can be used as a basis for revising the designed prototype (Elmunsyah et al., 2019). These stages must be carried out sequentially and cannot be randomized (Cotter et al., 2023). The creation of E-modules using the ADDIE method emphasizes the needs and goals of students, thus allowing teachers to take on the role of decision-makers in the learning process (Zhang et al., 2024).

The ADDIE model was systematically applied to develop the E-Module. In the Analyze phase, needs were identified through interviews with lecturers and students, ensuring the module addressed specific gaps in the User Experience Design course. The Design phase focused on planning the flipbook using a Problem-Based Learning approach, with detailed flowcharts and wireframes guiding the structure. During Development, the module's elements were assembled and refined based on the design, integrating feedback from stakeholders. The Implementation phase involved testing the E-Module in classroom settings and assessing its effectiveness in real-time. Finally, the Evaluation phase provided continuous feedback, leading to iterative improvements throughout the development process. Each ADDIE stage was crucial in ensuring the E-Module was both effective and aligned with the course's educational goals.

This E-Module undergoes validation, testing, and evaluation stages to assess its success. The subjects of this study were students of the Informatics Engineering Education

Undergraduate Study Program at the State University of Malang who took the User Experience Design course. The data consisted of qualitative input from media expert validators, material experts, and students, and quantitative questionnaire scores from the same groups (Bachri et al., 2024). The analysis was conducted to evaluate the feasibility of the flipbook e-module and the level of student learning interest after using the flipbook. Student participation in activities is a process of learning that goes beyond acquiring knowledge, as it also develops the physical and psychological potential of students while increasing their initiative and creativity (Anggerani et al., 2022).

## RESULT AND DISCUSSION

The Problem-Based Learning (PBL) flip book e-module for the User Experience Design course was developed to assess the learning interest of undergraduate students in the Informatics Engineering Education program at Universitas Negeri Malang. This media aims to enhance student understanding (Mardiana & Harti, 2022).

The User Experience Design flip book e-module includes content on user experience, user interface, design thinking, and its five stages, aligned with the course's syllabus, which emphasizes iterative learning and the importance of empathy in the design process. It comprises 12 sequential chapters in accordance with the syllabus. The e-module supports learners in developing critical thinking skills for task completion (Janna & Vebrianto, 2023).

This flip book offers evaluation questions at the end of each chapter, including group assignments, individual tasks, and quizzes. Evaluation questions are structured as essay questions administered via Google Forms. Quizzes can be answered directly at the end of Chapters 1 and 5, with feedback provided in the form of final grades. These questions are structured as essay questions and are administered via Google Forms, a method that aligns revision of Bloom's Taxonomy, which advocates for assessments that measure higher-order thinking skills (Hilmi et al., 2022). The e-module also features pre-test and post-test questions at the beginning and end of Chapters 1, 5, and 12. Developed as an .html file, the e-module is accessible through various devices using web browsers such as Chrome, Edge, Firefox, and Opera. Additionally, this educational media includes interactive elements such as music, videos, navigation, and task buttons (Yanuarti et al., 2022). Interactive,

responsive, media-rich online learning modules positively affect academic success and are significant predictors of higher final scores in immersive scheduling models (Goode et al., 2022).

The flip book e-module will undergo a validation process involving guidance lecturers, media experts, content experts, and users through small and large groups. The trial data will include expert validation, user testing, and student interest. The validation activities conducted by media experts will be based on five criteria, as outlined in Table 1.

Table 1. Data Result of Media Expert Validation Before Revision

No	Aspect	$\sum Tse$	$\sum Tsh$	P (%)
1	Software Engineering	40	45	88.88%
2	Content Quality	21	25	84%
3	Presentation Design	19	25	76%
4	Interaction Usability	14	15	93.33%
5	Accessibility	4	5	80%
<b>Total</b>		<b>98</b>	<b>115</b>	<b>85.21%</b>

Table 1 shows the results of the media expert validation before revisions, covering Software Engineering, Content Quality, Presentation Design, Interaction Usability, and Accessibility. The overall feasibility of the e-module is rated at 85.21%. The Software Engineering score of 88.88% indicates a solid technical foundation, aligning with principles of reliable software development (Morais et al., 2021). However, the Content Quality score of 84% suggests room for improvement in ensuring that the content engages students effectively. The Presentation Design score of 76% highlights the need for significant revisions to enhance clarity and user engagement, in line with multimedia learning theory. The high Interaction Usability score of 93.33% reflects a user-friendly design, which is crucial for maintaining student engagement (Tsai et al., 2021). The Accessibility score of 80% suggests that while the e-module is generally accessible, further improvements are needed to fully accommodate all users.

Additionally, the results of the data processing from media expert validation after revisions to the educational media are presented. The validation data of the media experts for the revised educational media are detailed in Table 2.

Table 2. Data Result of Media Expert Validation  
After Revision

No	Aspect	$\sum T_{se}$	$\sum T_{sh}$	P (%)
1	Software Engineering	40	45	88.88%
2	Content Quality	21	25	84%
3	Presentation Design	21	25	84%
4	Interaction Usability	15	15	100%
5	Accessibility	4	5	80%
<b>Total</b>		<b>101</b>	<b>115</b>	<b>87.82%</b>

Based on Table 2, the User Experience Design flip book e-module is deemed feasible with a validation score of 87.82%. The media expert validation assessment is included. The Software Engineering aspect was rated as highly possible with a score of 88.88%. The flip book e-

module exhibits excellent quality in meeting user needs (Lasaret & Suryawati, 2022). The Content Quality aspect received a score of 84%, falling into the highly feasible category, indicating that the organization of content, language, images, and videos is clear and easily understood by users of the flip book e-module (Yanuarti et al., 2022). The Presentation Design aspect, with a percentage of 84%, is categorized as highly feasible. The design of color combinations, fonts, and graphics is engaging. The flip book e-module is effective as an educational media (Setiawati et al., 2019). The Interaction Usability aspect is categorized as highly feasible with a score of 100%, indicating the effectiveness of the flip book e-module with clear navigation buttons (Christanto & Sedyono, 2020). The Accessibility of the flip book is rated as feasible with a score of 80%, allowing users to access it anytime and anywhere for learning (Solikin, 2018).

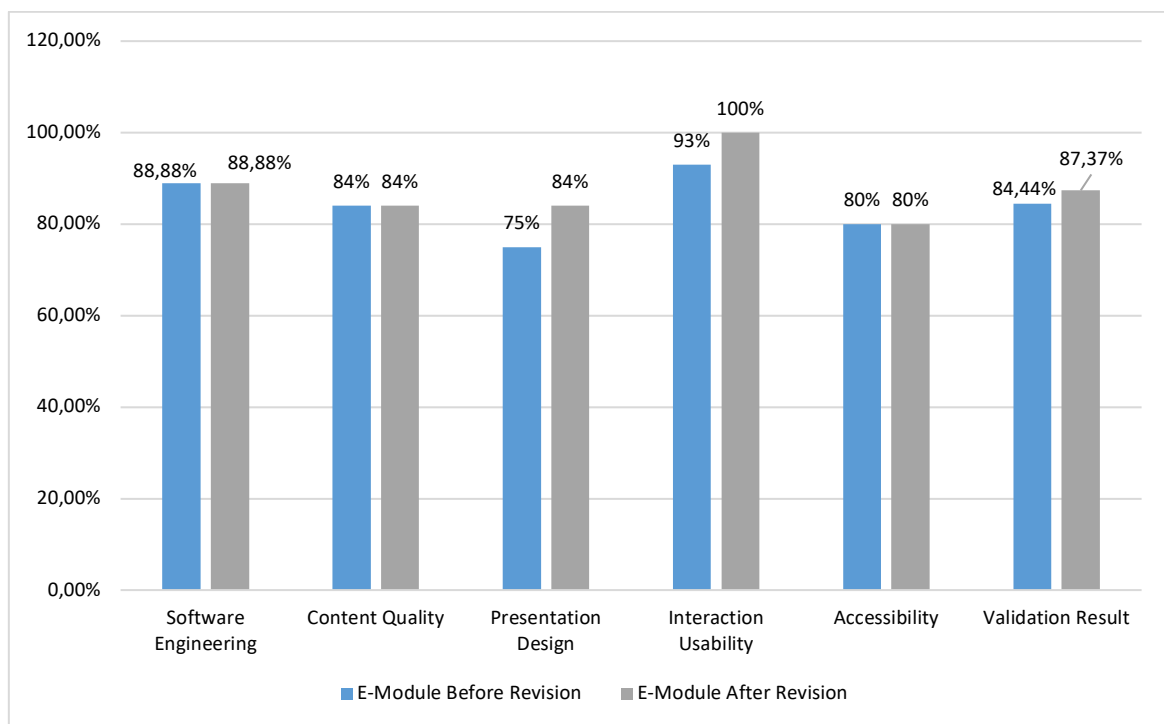


Figure 1. Comparison of media expert validation results data before and after revision

Figure 1 illustrates the comparison of validation results before and after revision by the media experts. The revision of the flip book improved the validation score from 85.21% to 87.82%. In addition to quantitative data, media experts provided qualitative feedback, such as recommendations for organizing the questions.

The final outcome was deemed satisfactory and ready for use in research.

The validation activities conducted by the content experts from Universitas Negeri Malang focused on three criteria: Instructional Design, Content Quality, and Language. The validation data are presented in Table 3.

Table 3. Data Result of Material Expert Validation

No	Aspect	$\sum Tse$	$\sum Tsh$	P(%)
1	Learning Design	26	30	86.66%
2	Content of the material	36	45	80%
3	Language and communication	24	30	80%
<b>Total</b>		<b>86</b>	<b>105</b>	<b>81.90%</b>

The data calculations presented in Table 3 indicate that the UX flip book has a very feasible rating with a total validation score of 81.90%. The Instructional Design aspect received a highly feasible category with a score of 86.66% (Royhanin, 2022). It includes all essential elements, such as a table of contents, usage instructions, learning objectives, etc. The flip book e-module is suitable as an alternative self-study teaching media. The Content Quality aspect, with a score of 80%, falls into the feasible category, demonstrating the effective application of the learning model for teaching and learning processes. Interactive e-modules support complex learning (Wulandari et al., 2021). The Language and Communication aspect of the flip book e-module is rated as feasible with a percentage score of 80%, facilitating user comprehension (Cholid et al., 2016). The material was validated by content experts for font consistency. After revisions, the media is ready for user testing in the next phase.

User testing was conducted with students from the S1 Informatics Engineering Education program at Universitas Negeri Malang using both the flip book and e-module media. The evaluation was performed through questionnaire completion. Detailed explanations of the results from both small and large group tests are provided.

The testing of the flip book e-module with 14 students from the 2022 cohort of the S1 Informatics Engineering Education program involved assessments through a questionnaire covering four criteria aspects. The validation data results are presented in Table 4.

Table 4. Data Result of Small Group Test

No	Aspect	$\sum Tse$	$\sum Tsh$	P (%)
1	Learning Design	549	630	87.14%
2	Visual Communication	638	770	82.85%
3	Feedback	186	201	88.57%
4	Accessibility	438	490	89.38%
<b>Total</b>		<b>1811</b>	<b>2100</b>	<b>86.23%</b>

The data analysis presented in Table 4 indicates that the flip book is highly suitable for use, with a total percentage of 86.23%. This very feasible rating reflects the media's appropriateness for its intended use. The trial was conducted via an online questionnaire and received high scores in the Instructional Design aspect, which is in line with Instructional Design Theory, which emphasizes the importance of comprehensive learning design to increase learning effectiveness (Nurfadhillah et al., 2021). The Visual Communication aspect achieved a very feasible category with a score of 82.85%, enabling learners to comprehend the material effectively (Hamid et al., 2020). Shows that visual communication elements such as layout, color and graphics greatly influence students' ability to understand the material presented. Appropriate use of visual elements can facilitate understanding complex and abstract concepts more effectively. The Feedback aspect received a score of 88.57%, categorized as very feasible. Feedback on quizzes, assignments, pre-tests, and post-tests serves as a tool for measuring student skills (Sumarno, 2016). The Accessibility aspect was rated as very feasible with a score of 89.38%, facilitating participants' access to material through the interactive e-module (Wulandari et al., 2021). Small group testing of the flip book provided suggestions for improvements related to technology, font, and color components to enhance quality.

Small group testing provides suggestions for improvements regarding technology, fonts, and color components to improve quality. After revisions were made based on the results of the small group test, large group testing was carried out involving 36 students from the class of 2022 of the Informatics Engineering Education Bachelor's program. This testing not only confirms previous results but also shows consistency with previous theory and research and provides deeper insight into how these flip books function on a broader scale. Data from the evaluation carried out via the Google Forms questionnaire are presented in Table 5, which shows the improvement in quality after revision.

The data analysis presented in Table 5 indicates that the Problem-Based Learning (PBL) User Experience Design flip book has an excellent feasibility rating, with a percentage of 87.38%. The flip book e-module is deemed appropriate and suitable as an educational media. The Instructional Design aspect also received a score of 87.90%, categorized as very feasible, reflecting the completeness of content

important for various learning styles of students (Putri et al., 2022). The Visual Communication aspect was rated as very feasible with a score of 87.12%, facilitating students' understanding of abstract material visually (Raqzitya & Agung, 2022).

The Feedback aspect achieved a percentage score of 86.48%, falling into the very feasible category. This indicates that the feedback is effective in measuring student capabilities. The Accessibility aspect received a score of 87.54%, categorized as very feasible, with the flip book offering easy navigation and the e-module enhancing learning efficiency (Eliyasni et al., 2021). Large-scale testing of the flip book received positive feedback and suggestions for summarizing material and improving coloring on quizzes and assignments. The researchers considered these inputs for improving the educational media, resulting in a comparison of small and large group trial data, including revisions and pre-revisions, as presented in Figure 2.

Table 5. Data Result of Big Group Test

No	Aspect	$\sum T_{se}$	$\sum T_{sh}$	P (%)
1	Learning Design	1424	1620	87.90%
2	Visual Communication	1725	1980	87.2%
3	Feedback	467	540	86.48%
4	Accessibility	1103	1260	87.54%
<b>Total</b>		<b>4719</b>	<b>5400</b>	<b>87.38%</b>

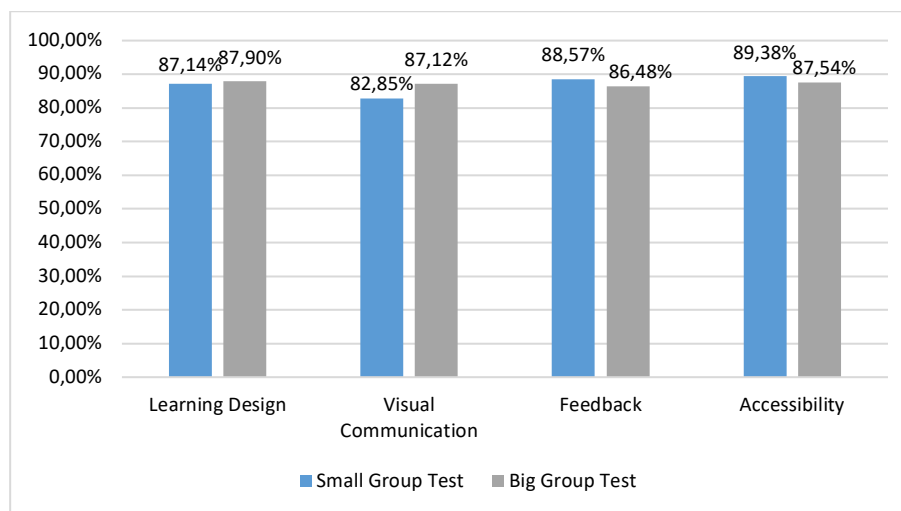


Figure 2. Comparison chart of aspects of user trial results

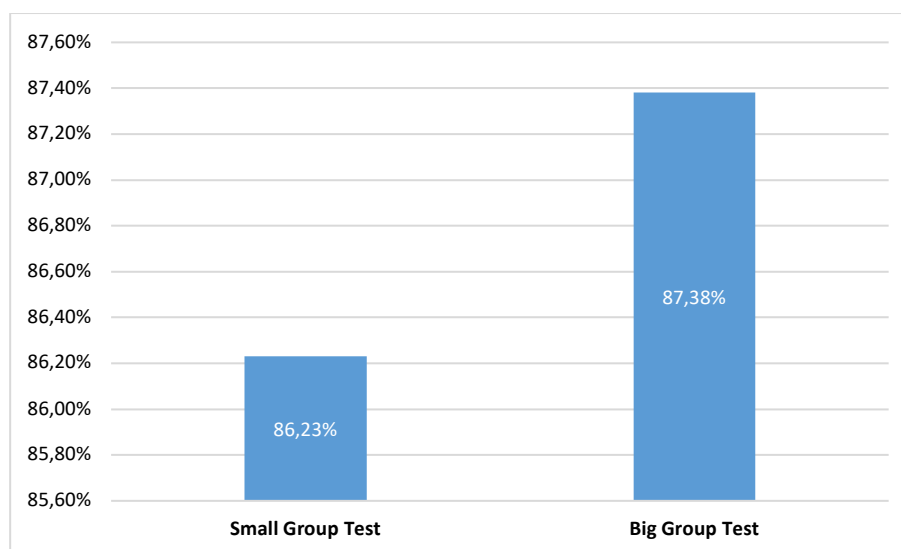


Figure 3. Comparison chart of user test results

Figure 3 illustrates the differences in the final results of user testing between the small group and the large group. It shows a comparison of user trial results based on each supporting aspect used to develop the user instrument, as presented in Figure 2. The difference in user testing scores between the small and large scales shows an improvement from 86.23% to 87.38%. This variation is attributed to differing conditions and user experiences. The positive results from the trials indicate that the flip book-based e-module has been improved and is suitable for educational use.

Table 6. Data from Learning Interest Trial Results

No	Aspect	$(\sum x)$ Total Score	(N) Maximum Score	(%) Percentage
1	Enjoyment	1083	1260	85.95%
2	Students Engagement	775	900	86.11%
3	Students Interest	939	1080	86.94%
4	Students Attention	776	900	86.22%
	<b>Average</b>	<b>3573</b>	<b>4140</b>	<b>86.30%</b>

Interest in learning was assessed with 36 students from the S1 Informatics Engineering Education program. Students completed a learning interest questionnaire after using the e-module. The results will indicate the level of learning interest based on four criteria. The processed data from the learning interest validation questionnaire is presented in Table 6.

Data analysis results indicate that the use of the Problem-Based Learning (PBL) e-module on User Experience Design successfully increased student learning interest, achieving a total score of 86.30%, categorized as very high interest according to the provided criteria. The flip book e-module effectively engages student interest (Tafonao, 2018). The Enjoyment aspect scored 85.95%, reflecting a very high level of interest from students towards the flip book-based e-module. Student Engagement also showed a high score of 86.11%, demonstrating student involvement in using the flip book. Student Interest achieved a score of 86.94%, indicating students' interest in the flip book e-module. Student Attention scored 86.22%, showing the attention students paid to the e-module. The trial results show that the flip book e-module is communicatively structured, flexible, and aligns with student learning interest levels.

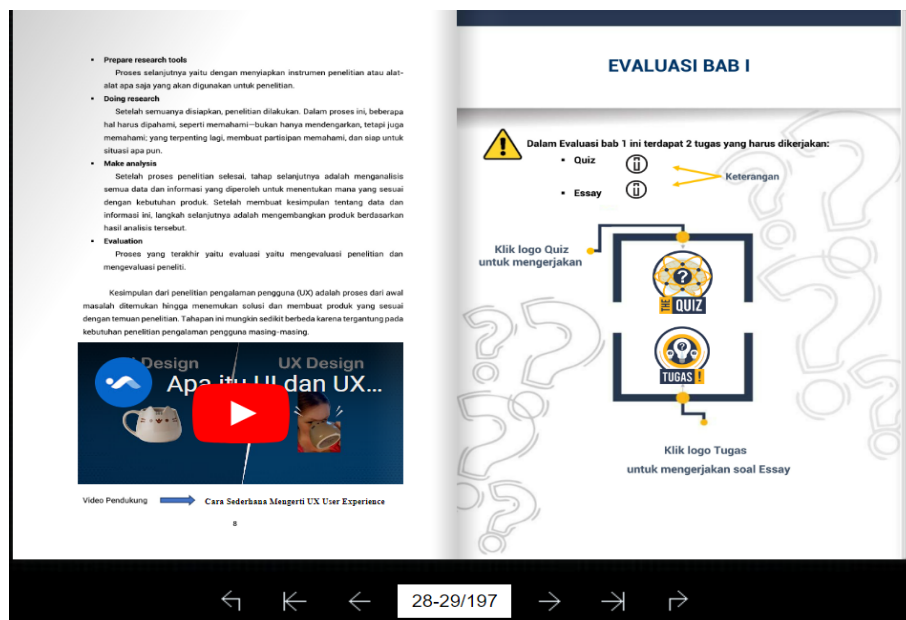


Figure 4. Evaluation features page



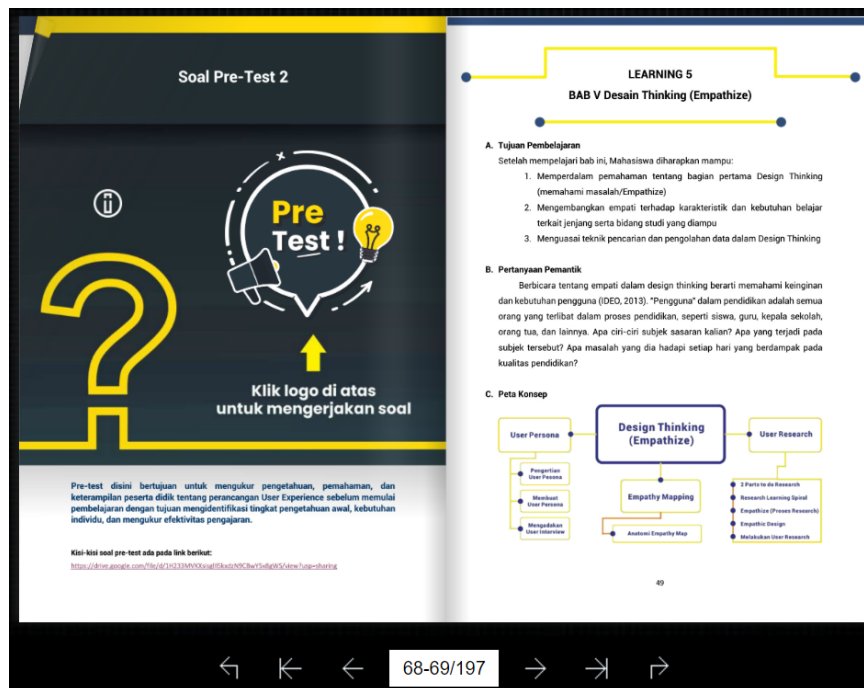


Figure 5. Pre-test pages

Initially, the UX design e-module did not include pre-tests and post-tests, only evaluations at the end of each chapter. These evaluations comprised interactive multiple-choice quizzes and individual or group assignments. Interactive quizzes were placed at the end of Chapters 1 and 5, where students are directed to click on the quiz button in the flip book e-module, as shown in

Figure 7. Individual and group assignments were found at the end of Chapters 1 through 12, with questions in the form of essays or enrichment accessed via Google Forms. Students can access these assignments by clicking on the task logo button in the e-module. The appearance of assignment questions in the e-module is depicted in Figures 4, 5, dan 6. Figure 7 shows quis page.

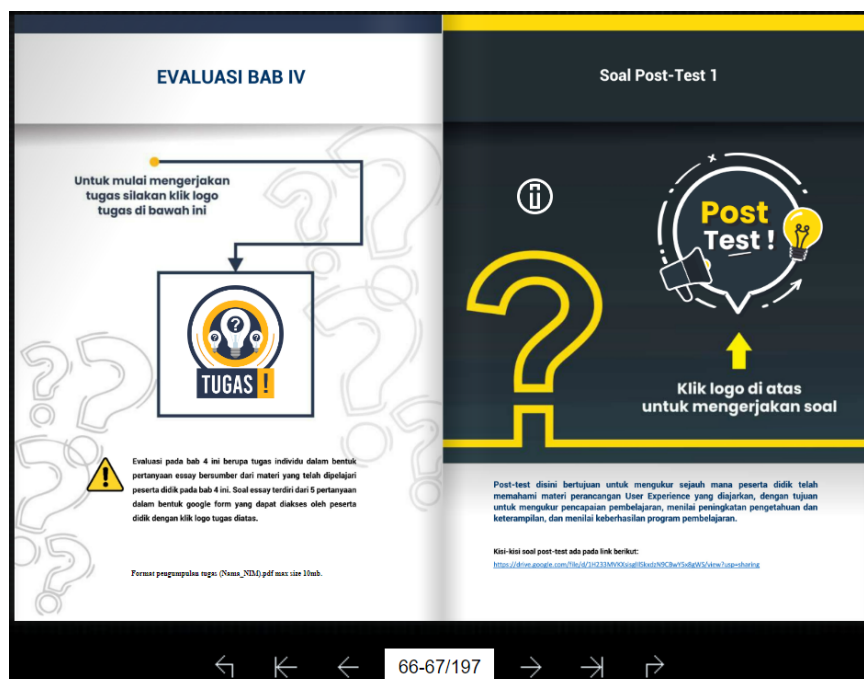


Figure 6. Post-test pages



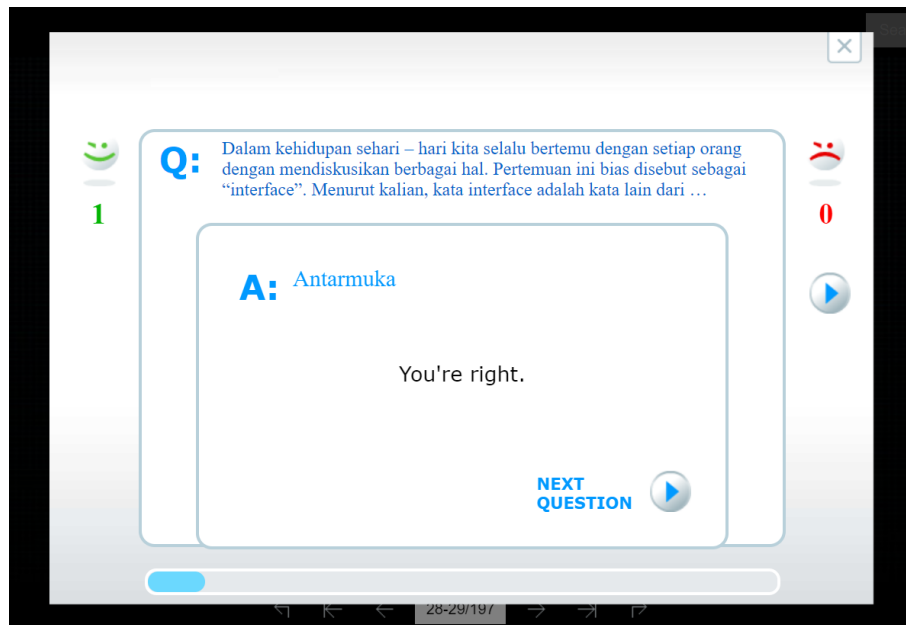


Figure 7. Quiz page

## CONCLUSION

This study successfully developed an e-module in the form of a flip book using a Problem-Based Learning (PBL) approach, specifically designed for the User Experience Design course for undergraduate students of Informatics Engineering Education at the State University of Malang. This e-module can be accessed independently via a laptop or smartphone, offering users the flexibility to learn

anywhere and anytime. Validation and trials involving media experts, material experts, and both small and large-scale users demonstrated that this e-module has a very high feasibility, with feasibility percentages of 87.82%, 81.90%, 86.23%, and 87.38%, respectively. Furthermore, trials conducted to determine user learning interest showed that student interest was very high, with a final score of 86.30%, indicating that the objective of developing this learning media has been successfully achieved.

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