



Flipbook-Based E-Module with Project-Based Learning for Ship Outfit Construction: Validity, Practicality, and Effectiveness

Abdul Habib Arrasyidi Desky^{1*}, Ranida Pradita¹, Choirozyad Muhammad Hafidz¹, M. Bagas Syaath Nuartoro¹, Amin Mustofa¹

¹ Electrical Engineering Program, Universitas Teknologi Nusantara, Bogor, Indonesia

ARTICLE INFO

Article history:

Received: July, 2026

Received in revised from: August, 2026

Accepted: September, 2026

Available online: September, 28, 2026

Keywords: E-module; Flipbook; Project-Based Learning; Ship Outfit Construction; 4C skills

ABSTRACT

Vocational graduates are expected to master technical competencies and 21st-century skills, yet learning in the Ship Outfit Construction subject at SMKN 5 Padang is still dominated by lectures and slide presentations, which limits critical thinking, motivation, and the link between theory and practice. This study developed a flipbook-based e-module integrated with Project-Based Learning (PjBL) for 2D and 3D drawing of an auxiliary-engine foundation (generator seating) and examined its validity, practicality, and effectiveness. A Research and Development approach with the ADDIE model was combined with a mixed-method, quasi-experimental non-equivalent control group design involving 40 students (20 experimental, 20 control) selected purposively. Instruments were expert validation questionnaires, practicality questionnaires, a 50-item learning-outcome test, and a 4C skills assessment. Four experts judged the e-module valid (Aiken's $V = 0.56-0.81$; Cronbach's $\alpha = 0.817-0.951$). Teachers and students rated it very practical (91.11% and 91.18%). Across the 40 students, the mean test score rose from 43.10 to 75.10. The experimental class outperformed the control class in the post-test (mean difference = 5.00, $t(38) = 6.43$, $p < .001$) and in 4C skills ($t(38) = 4.25$, $p < .001$), with a significant multivariate effect (Wilks' $\Lambda = .158$, $F(2, 37) = 97.20$, $p < .001$). The e-module is therefore a valid, practical, and promising medium for project-based learning in ship design, although the small, non-randomised sample calls for replication.

1. Introduction

Vocational education is expected to prepare graduates whose competencies match the demands of the labour market. Official labour-force statistics, however, show that vocational high school graduates have recorded the highest open-unemployment rate among all education levels for three consecutive years (Badan Pusat Statistik, 2024), which points to a persistent gap between what schools produce and what industry requires (Masriani et al., 2026). Modern industry looks for workers who can think critically, solve problems, communicate, collaborate, and create, that is, the 4C skills (Taali et al., 2024); (Risna et al., 2026). In technical fields such as ship design, these skills are exercised when learners turn technical drawings into three-dimensional models and justify their design decisions.

* Corresponding author.

E-mail address: abdulhabibarsd@gmail.com

<https://doi.org/10.56806/jh.v7i3.502>

Classroom observation in the Ship Design and Construction expertise program at SMKN 5 Padag shows that the Ship Outfit Construction subject is still taught through teacher explanation, PowerPoint slides, and question-and-answer sessions. Students tend to be passive, show limited critical thinking and problem-solving ability, have low motivation for tasks that demand creativity, and struggle to connect theory with drawing practice. No interactive digital teaching material integrating text, images, video, and simulation was available for the subject. Teacher-centred instruction is known to be weak at developing problem-solving, critical thinking, communication, and collaboration (Fajaryati & Pranoto, 2013), so a different instructional arrangement is needed.

Project-Based Learning (PjBL) organises learning around authentic projects, inquiry, and teamwork, and it has been associated with the development of both technical and soft skills (Ningsih et al., 2025). PjBL is demanding to run, however, and technology support can help teachers manage it (Sudianti et al., 2025). Electronic modules (e-modules) are one such support: they allow self-paced study, combine multimedia (Habib et al., 2025), and can provide scaffolding for independent and inquiry-based learning (Virnindo et al., 2026). Flipbook applications such as Flip PDF Professional turn PDF documents into page-turning interactive publications, and e-modules built with them have been reported for integrated science and gamified junior-secondary mathematics (Pebrianti et al., 2026). PjBL e-modules have also been developed for (Fiona et al., 2025); (Ermawalis et al., 2025), mathematics (Deviana et al., 2025), biology (Irfan et al., 2025), chemistry, and vocational subjects.

Most of these products, however, address general or science subjects. To the authors' knowledge, evidence is scarce for ship design, where the learning object is a technical drawing and a 3D model, and few studies test a flipbook PjBL e-module against a comparison class while measuring cognitive outcomes and 4C skills together. This study therefore aims to (1) develop a flipbook-based e-module with the PjBL model for Ship Outfit Construction (3D Modelling) that is valid and feasible, (2) analyse its practicality from teachers' and students' assessments, and (3) examine its effectiveness in improving learning outcomes and 4C skills.

The study rests on constructivist learning theory, in which learners build knowledge through activity, social interaction, and problem solving (Competency, 2026), and on the view that well-designed combinations of text, images, video, and audio can lower the cognitive load of abstract technical content (Desky et al., 2025). Figure 1 shows how these ideas are combined: the problems found in the classroom are addressed by a flipbook e-module that embeds the PjBL syntax, and its quality is judged through validity, practicality, learning outcomes, and 4C skills.

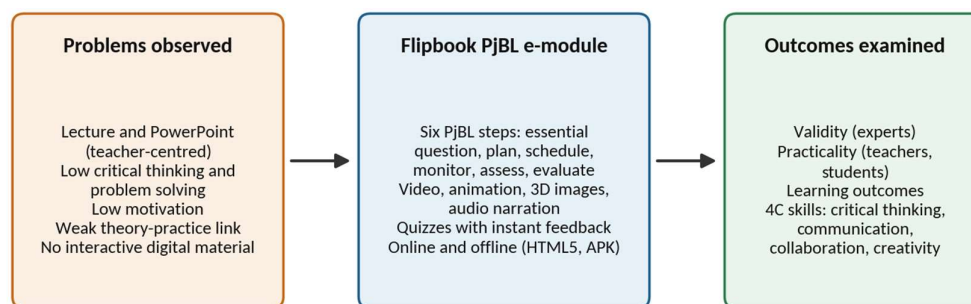


Fig. 1. Conceptual framework of the study

2. Methodology

2.1 Research design

The study used Research and Development (R&D) (Sugiyono, 2020) with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), as summarised in Figure 2. A mixed-method approach was applied: quantitative data came from expert validation, practicality questionnaires, and tests, whereas qualitative data came from expert comments and user feedback. Effectiveness was tested with a quasi-experimental nonequivalent control group design. The experimental class learned with the flipbook PjBL e-module, the control class continued with lectures and PowerPoint slides, and both classes took a pre-test, a post-test, and a 4C skills assessment.

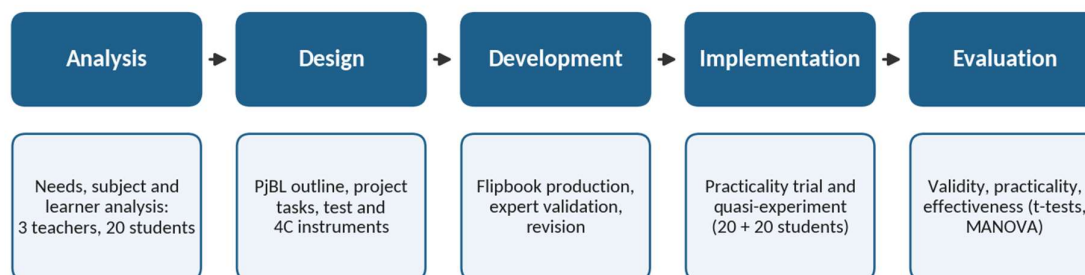


Fig. 2. Research procedure based on the ADDIE model

2.2 Setting and participants

The research was carried out in the Ship Design and Construction expertise program of SMKN 5 Padang in the 2025/2026 academic year. The population comprised 90 students taking Ship Outfit Construction. Forty students were selected purposively and split into an experimental class ($n = 20$) and a control class ($n = 20$), matched on grade point average, pre-test score, age, and previous learning experience; students who had used a similar e-module were excluded. The needs analysis involved three teachers and 20 students. The practicality trial involved three teachers and 20 students who had taken the subject, and items were tried out with 20 students outside the main sample.

2.3 Development procedure

In the analysis stage, needs were identified through literature review, observation, interviews, and questionnaires. In the design stage, the e-module outline, PjBL project tasks, evaluation tools, and research instruments were prepared. In the development stage, the module was written in Microsoft Word, exported to PDF, and converted to a flipbook with Flip PDF Professional; Canva was used for the cover, a generative AI tool for simple 2D-to-3D illustrations, text-to speech for narration, and Quizizz for interactive quizzes. The flipbook was packaged as HTML5, EXE, and Android APK files and distributed through Google Drive. Experts then validated the product, and revisions followed their comments. In the implementation stage, practicality was tested and the quasi-experiment was run. In the evaluation stage, validity, practicality, and effectiveness were analysed.

2.4 Instruments

Four experts (subject matter and media) rated the e-module on a validation questionnaire of 60 items covering seven aspects: content, PjBL presentation, language, multimedia, ease of use, technical quality, and PjBL effectiveness. The learning-outcome test, a 50-item multiple-choice instrument built from a blueprint covering cognitive levels C1-C6, was validated by two education-evaluation experts. The 4C assessment sheet had 50 items (critical thinking 15, collaboration 12, communication 9, creativity 14) and was validated by experienced teachers. Practicality was measured with five-point Likert questionnaires: five aspects for teachers and six aspects for students.

Table 2. Research instruments

Instrument	Items	Respondents / raters	Purpose
E-module validation questionnaire	60	4 experts	Content, PjBL, language, multimedia, use, technical quality
Learning-outcome test (pre/post)	50	40 students; 2 expert validators	Cognitive outcomes, C1-C6
4C assessment sheet	50	Teacher-rated; experienced teachers validated	Critical thinking, collaboration, communication, creativity
Practicality questionnaire: teachers	30	3 teachers	Five aspects, five-point scale
Practicality questionnaire: students	35	20 students	Six aspects, five-point scale
Needs-analysis questionnaire	6 aspects	3 teachers, 20 students	Need for the e-module

Note: Item counts for practicality follow the number of indicators reported per aspect.

2.5 Data analysis

Expert agreement was analysed with Aiken's V ($V \geq 0.80$ very valid; $0.60 \leq V < 0.80$ valid; $0.40 \leq V < 0.60$ fairly valid), and internal consistency with Cronbach's α ($\alpha \geq 0.80$ reliable). Practicality was expressed as the respondent achievement level ($TCR = \text{mean score/ideal score} \times 100\%$; $> 80\%$ very practical, $> 60\text{--}80\%$ practical). Test items were examined for difficulty (hard 0.00–0.30, medium 0.31–0.70, easy 0.71–1.00) and discrimination. Normality (Kolmogorov–Smirnov, Shapiro–Wilk) and homogeneity (Levene) were checked before paired and independent-samples t -tests, Cohen's d , and MANOVA on post-test and 4C scores ($\alpha = .05$). Analyses used SPSS 29, and SmartPLS 4 supported the validity and reliability checks.

3. Results

3.1 Research findings

Teachers and students strongly agreed that a PjBL e-module was needed (Table 1). Both groups gave the highest score to the need to develop 4C skills (4.55 and 4.53), followed by preferences for technology and multimedia (4.33 and 4.36). Students rated the need for content and materials higher than teachers did (4.47 vs. 4.12), mainly for contextual examples and industry applications, and all aspects fell between 4.04 and 4.55 on the five-point scale.

Table 1. Results of the needs analysis (mean scores, 1–5 scale)

Aspect	Teachers (n = 3)	Students (n = 20)
Demographic and academic characteristics	4.37	4.16
Learning style preferences	4.04	4.21
Content and material needs	4.12	4.47
Technology and multimedia preferences	4.33	4.36
Familiarity with and expectations of PjBL	4.29	4.25
Need to develop 4C skills	4.55	4.53
Overall mean	4.28	4.33

3.1 Design and product specification

The e-module opens with a cover, a user guide, a preface, tables of contents, tables, figures, and videos, and a glossary. It then presents three learning modules on 2D and 3D drawing of the generator seating (auxiliary-engine foundation), each containing the material, a summary, a project task, exercises, and feedback with follow-up, and closes with a conclusion and references (Figure 3). Project tasks follow the six PjBL steps: essential question, design a plan, create a schedule, monitor the students and the progress of the project, assess the outcome, and evaluate the experience. Each task starts with an open-ended essential question, gives students planning templates and a scheduling tool, and ends with a performance rubric covering planning, execution, teamwork, creativity, and the final presentation. Interactive features include navigation, search, bookmarks, digital notes, quizzes with immediate feedback, and discussion and upload spaces. The product runs on Windows 10/11, macOS 10.15 or later, and Android 8.0 or later, online and offline.

Table 3 summarises the technical specification of the product. The e-module is distributed as an HTML5 flipbook, an executable file, and an Android package, so that students can open it in a browser, on a laptop, or on a phone. Because the file is large, the design uses an initial download followed by offline use, which is intended to help in classrooms with unstable connections.

Table 3. Technical specification of the flipbook e-module

Aspect	Specification	Purpose
Output format	HTML5 flipbook, EXE, APK	Multimedia publication for several devices
Platform	Windows 10/11, macOS 10.15+, Android 8.0+	Cross-platform access
Browsers	Chrome, Firefox, Microsoft Edge	Full HTML5 support
Display	1920 × 1080 (desktop); responsive layout	Adapts to screen size
File size / connection	150–500 MB; online and offline hybrid	Balance of quality and loading speed
Media formats	MP4 H.264 1080p; MP3/AAC 128–320 kbps; JPEG, PNG, SVG	Clear video, narration, and technical drawings
Interactive elements	HTML5, JavaScript, hyperlinks, Quizizz	Navigation, quizzes, feedback

The project tasks were mapped to the PjBL syntax and to the 4C skills they are meant to train (Table 4). The mapping guided both the writing of the tasks and the construction of the 4C assessment sheet.

Table 4. PjBL syntax, e-module components, and targeted 4C skills

PjBL step	Component in the e-module	Main 4C skill
Essential question	Open-ended question on an authentic ship-outfit problem	Critical thinking
Design a plan	Planning template, resource identification, needs analysis	Creativity
Create a schedule	Timeline tool, proposal assessment table, fishbone diagram	Collaboration
Monitor progress	Documentation upload, group discussion, student–teacher communication	Communication
Assess the outcome	Proposal rubric, performance criteria, oral test	Critical thinking, communication
Evaluate the experience	Quiz scoring criteria, reflection, follow-up tasks	Communication, creativity

Note. The 4C mapping is the authors' design rationale, not an empirical result.

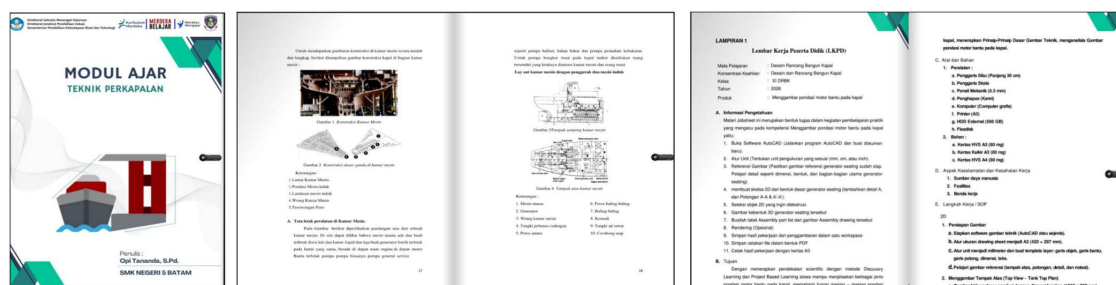


Fig. 3. Screens of the flipbook PjBL e-module: cover, learning material page, and project worksheet

3.3 Validity and reliability

All 60 e-module items obtained Aiken's V between 0.56 and 0.81 (Table 5). Most items were valid, and 22 items reached the very valid category; two items, one on PjBL presentation (KP-PjBL8) and one on language (KB3), scored 0.56 and were revised on the experts' advice. Reliability of the validation questionnaire ranged from 0.817 to 0.951, the highest being for multimedia. The test instrument and the 4C assessment sheet were also valid and reliable.

Table 5. Validity (Aiken's V) and reliability (Cronbach's α) of the e-module and instruments

Object / aspect	Aiken's V range	Category	α
E-module: content	0.61–0.75	Valid	0.817
E-module: PjBL presentation	0.56–0.80	Fairly valid very valid	0.834
E-module: language	0.56–0.80	Fairly valid very valid	0.829
E-module: multimedia	0.66–0.81	Valid very valid	0.951
E-module: ease of use	0.75–0.81	Valid very valid	0.861
E-module: technical quality	0.66–0.80	Valid very valid	0.821
E-module: PjBL effectiveness	0.63–0.80	Valid very valid	0.846
Test instrument (four aspects, two experts)	0.68–0.92	Valid very valid	0.829-0.926
4C assessment sheet (50 items)	0.625–0.875	Valid very valid	0.806-0.921

Note. Categories follow the Aiken's V criteria in Section 2.5. The e-module was judged by four experts.

3.4 Practicality

Teachers gave a mean of 4.56 (TCR = 91.11%) and students a mean of 4.59 (TCR = 91.18%), both in the very practical category (Figure 4). Among teachers, ease of implementation and flexibility of use scored highest (92.22%). Among students, interactivity was highest (93.11%), followed by intuitive navigation and learning motivation (92.22% each), and ease of access was lowest (90.23%). Only two teacher items (media effectiveness and classroom management) reached 80.00%, which is practical rather than very practical (Vaesar et al., 2026).

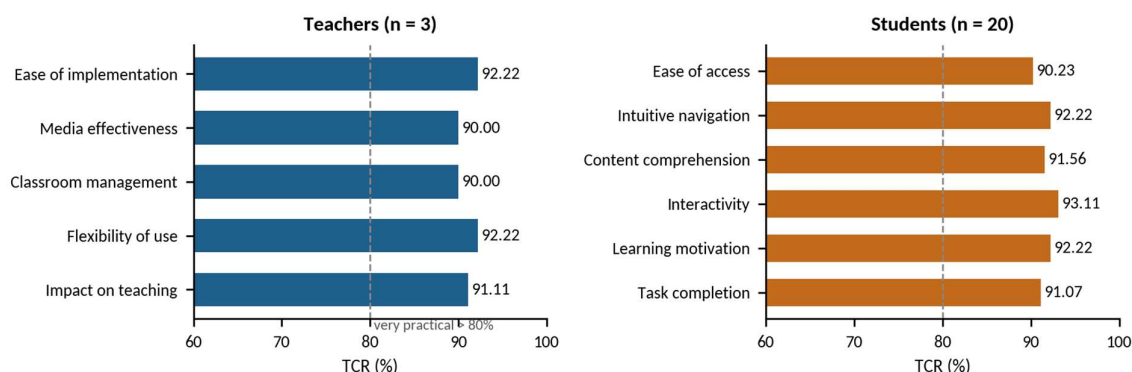


Figure 4. Practicality of the e-module by aspect (TCR, %) from teachers and students

3.1.5 Quality of test items

Item analysis showed a shift in difficulty from pre-test to post-test (Table 6). The pre-test was dominated by hard items (48%), whereas the post-test was dominated by medium items (72%). No item had negative discrimination in either test, although 10 post-test items (20%) had poor discrimination, which is a point for revision.

Table 6. Difficulty and discrimination of the 50 test items, n (%)

Index category	Pre-test	Post-test
Difficulty: hard	24 (48%)	12 (24%)
Difficulty: medium	23 (46%)	36 (72%)
Difficulty: easy	3 (6%)	2 (4%)
Discrimination: very good / good	14 (28%) / 13 (26%)	1 (2%) / 13 (26%)
Discrimination: sufficient	22 (44%)	26 (52%)
Discrimination: poor	1 (2%)	10 (20%)

3.1.6 Effectiveness

Across the 40 students, the mean test score increased from 43.10 to 75.10, a gain of 32.00 points (Table 7). Data were normally distributed in both classes and variances were homogeneous, so parametric tests were used. Paired-samples *t*-tests showed a significant pre-test to post-test gain of 32.00 points in both the control class, $t(19) = 118.04$, $p < .001$, and the experimental class, $t(19) = 107.02$, $p < .001$. The independent-samples *t*-test showed that the experimental class scored higher than the control class in the post-test (mean difference = 5.00, $SE = 0.78$, $t(38) = 6.43$, $p < .001$) and in 4C skills (mean difference = 0.50, $SE = 0.12$, $t(38) = 4.25$, $p < .001$). Effect sizes and the multivariate test are shown in Table 8.

Table 7. Descriptive statistics and assumption tests (N = 40)

Statistic	Pre-test	Post-test
Mean (median)	43.10 (43.50)	75.10 (75.50)
Standard deviation	5.78	5.78
Minimum – maximum	34 – 54	66 – 86
Shapiro–Wilk <i>p</i> , control / experimental	.487 / .748	.914 / .582
Levene <i>p</i> (based on mean)	.365	.378

Note. Both classes were normally distributed ($p > .05$) and variances were homogeneous.

Table 8. Effect sizes and multivariate test for the experimental versus control class

Statistic	Post-test	4C skills	Interpretation
Cohen's <i>d</i> [95% CI]	2.87 [1.99, 3.75]	1.42 [0.84, 2.00]	Large
Hedges' correction	2.91	1.44	Large
Glass's Δ	2.71	1.35	Large
MANOVA (class effect, post-test and 4C combined)			
Pillai's Trace / Wilks' Λ	.842 / .158		$F(2, 37) = 97.20$ $p < .001$
Hotelling's Trace / Roy's Root	5.313 / 5.313		$F(2, 37) = 97.20$ $p < .001$

Note. Both MANOVA statistics were significant at $p < .001$ for the combined post-test and 4C scores.

3.1.7 Summary of findings

Table 9 brings the main findings together against the three research objectives.

Table 9. Summary of main findings by research objective

Objective	Key result	Judgement
1. Validity and feasibility	Aiken's V 0.56–0.81 (60 items); α 0.817–0.951	Valid and feasible
2. Practicality	Teachers 91.11%; students 91.18% (TCR)	Very practical
3. Effectiveness: post-test	Mean difference 5.00, $t(38) = 6.43$, $p < .001$; $d = 2.87$	Experimental class higher
3. Effectiveness: 4C skills	Mean difference 0.50, $t(38) = 4.25$, $p < .001$; $d = 1.42$	Experimental class higher
3. Effectiveness: combined	Wilks' $\Lambda = .158$, $F(2, 37) = 97.20$, $p < .001$	Significant multivariate effect

Note. Effect sizes are as computed from the study data and should be treated as provisional (see Section 3.3).

The needs analysis already pointed in the direction of the final design. Teachers and students both put the development of 4C skills first, which supports the decision to build the module around projects rather than around content delivery alone. The gap between students' and teachers' scores for content needs suggests that learners want more contextual examples from the shipbuilding industry, and future versions could add short case studies from shipyards (Sari et al., 2026).

The e-module met the validity criteria because its content, PjBL presentation, language, multimedia, and technical aspects were judged consistently by experts. The two weakest items concerned PjBL presentation and language, which suggests that the syntax and wording of project instructions deserve most attention when the module is refined. Similar expert-based validation with high agreement has been reported for flipbook PjBL modules in other subjects (Habib, Desky, Jalinus, et al., 2026).

Teachers and students agreed closely on practicality (91.11% vs. 91.18%). Interactivity and navigation were rated highest, which fits the module's design as a single package of text, video, animation, quizzes, and project templates that runs online and offline. This agrees with reports that flipbook e-modules are easy to use and engaging for students (Habib, Desky, Anwar, et al., 2026);(Padang, 2023). The comparatively lower rating for ease of access indicates that file size and device requirements may still limit some users.

On effectiveness, the experimental class outperformed the control class on both the post-test and the 4C skills, and the multivariate test confirmed a difference on the two outcomes taken together. The PjBL syntax offers a plausible explanation: essential questions prompt investigation and analysis, the planning step gives room for creative solutions, group projects require collaboration and communication, and quizzes with immediate feedback support self-monitoring (Habib, Desky, & Yulastri, 2026). The effect sizes are large, in line with reports that PjBL e-modules improve learning in vocational settings (Habib, Desky, Maksum, et al., 2026).

The item analysis adds a further point. The shift from hard to medium items between pre-test and post-test is consistent with learning gains, and the fall in discrimination is what would be expected when weaker students catch up. It also means that the post-test was less able to separate students, so test revision is advisable before the instrument is reused. For teachers, the practical message is that the module does not replace guidance: the highest practicality scores came from features that structure work (navigation, quizzes, templates), and teachers still need to act as facilitators who monitor group progress in the project steps (Kartini et al., 2026).

3.3 Limitations

These results should be read with caution. First, both classes gained the same 32.00 points on average, so the advantage of the experimental class rests on its higher post-test level, and baseline equivalence was not tested separately for the two classes; an analysis of covariance with the pre-test as covariate would give a stricter comparison. Second, the sample was small (20 students per class), purposively chosen, and not randomised, and effect sizes of this size are unusually large for classroom interventions and need replication. Third, 10 post-test items discriminated poorly, and the 4C assessment was a teacher-rated sheet. Finally, the intervention was short, so retention and transfer to workplace tasks remain untested.

3.4 Implications for practice and research

For vocational teachers, the study shows one way to combine a digital medium with project work without building a full learning-management system: the flipbook holds the material, the tasks, the templates, and the quizzes in one package, while the teacher facilitates. Schools that adopt it should plan device access, storage space for a file of 150-500 MB, and short orientation sessions on the PjBL steps. For curriculum developers, the mapping between project steps and 4C skills (Table 4) can be reused when writing project tasks for other subjects that depend on technical drawing or 3D modelling, such as machine drawing or building construction.

For researchers, three lines of work follow. First, a randomised or well-matched design with a pre-test covariate would test whether the advantage of the experimental class holds when initial differences are controlled. Second, observing students during the project steps would show which features of the module drive the gains in critical thinking and collaboration. Third, follow-up measures several weeks after instruction would show whether the gains last and whether they transfer to industry-style design tasks (Arwizet et al., 2026).

4. Conclusions

A flipbook-based e-module with the PjBL model for Ship Outfit Construction (3D Modelling) was developed through the ADDIE stages and judged valid and feasible by experts. Teachers and students rated it very practical. In the quasi-experiment, the experimental class scored higher than the control class in learning outcomes and 4C skills, and the multivariate test was significant. The e-module can therefore serve as a valid, practical, and promising medium for project-based learning in ship design and other vocational subjects that rely on technical drawing and 3D modelling. Teachers can use the e-module to move from lecture-based teaching toward guided projects, provided that schools supply devices and stable access, or the offline APK version. Future studies should use larger and randomised samples, compare groups with pre-test-adjusted analyses, refine the poorly discriminating test items, and examine long-term retention and transfer to industry tasks. The design can also be extended to other topics in ship design and to other vocational programs.

References

- Arwizet, K., Purwanto, W., Dewi, I. P., Habib, A., & Desky, A. (2026). *Development of a Web-Based CBT Worksheet for Routine Motorcycle Maintenance*. 12(6), 223–230. <https://doi.org/10.29303/jppipa.v12i6.15243>
- Competency, L. (2026). *PROJECT-BASED MODULE FOR STYLE AND LOOK COMPETENCY*. 10(1), 26–34.
- Desky, A. H. A., Ganefri, G., Yulastri, A., Ta'ali, T., Effendi, H., & Fiandra, Y. A. (2025). Entrepreneurship-Based School Management Model to Increase Entrepreneurial Interest of Vocational Education Students at SMK Negeri 5 Padang. *Al Qalam: Jurnal Ilmiah Keagamaan Dan Kemasyarakatan*, 19(1), 297. <https://doi.org/10.35931/aq.v19i1.4306>
- Deviana, B., Zen, Z., Rayendra, J, F. Y., Mirshad, E., & Desky, A. H. A. (2025). Development of E-modules Based on Quantum Learning in Projek IPAS for Class X Vocational High School. *Jurnal Penelitian Pendidikan IPA*, 11(9), 583–591. <https://doi.org/10.29303/jppipa.v11i9.12179>
- Ermawalis, J, F. Y., Darmansyah, Rayendra, Mirshad, E., & Desky, A. H. A. (2025). Media in Improving Teachers Professional Competence at SMAN 5 Batam. *Jurnal Penelitian Pendidikan IPA*, 11(9), 592–598. <https://doi.org/10.29303/jppipa.v11i9.12180>
- Fajaryati, N., & Pranoto, P. W. (2013). *E-MODULE DEVELOPMENT FOR THE SUBJECT OF MEASURING INSTRUMENTS AND MEASUREMENT*. 191–199.
- Fiona, Darmansyah, Zen, Z., J, F. Y., Mirshad, E., & Desky, A. H. A. (2025). The Effect of Applying the Archerys ID Model Instructional Design and Learning Motivation on Physics Learning Outcomes at SMAN 4 Batam. *Jurnal Penelitian Pendidikan IPA*, 11(9), 609–619. <https://doi.org/10.29303/jppipa.v11i9.12181>
- Habib, A., Desky, A., Anwar, M., Simatupang, W., & Adri, M. (2026). *Development and Evaluation of an AI-Integrated Project-Based Learning Model for Technical and Vocational Education*. 7(2), 319–326.
- Habib, A., Desky, A., Effendi, H., & Maksum, H. (2025). *Development of Project Based Learning E-Modules on Android Based Embedded System Subjects* Habib, A., Desky, A., Effendi, H., & Maksum, H. (2025). *Development of Project Based Learning E-Modules on Android Based Embedded System Subjects*. 11(10), 362–371. <https://doi.org/10.29303/jppipa.v11i10.12358>
- Habib, A., Desky, A., Jalinus, N., & Ananda, Y. F. (2026). *Synergizing Technological Innovation , Quality Management , and Inclusivity in Transforming Industry Responsive Technical and Vocational Education and Training TVET*. 7(1), 40–46.
- Habib, A., Desky, A., Maksum, H., Mukhaiyar, R., & Purwanto, W. (2026). *Development of Digital Learning Materials Based on Project- Based Learning Using CorelDRAW and Blender to Enhance Graphic Design and 3D Animation Skills*. 12(7), 823–835. <https://doi.org/10.29303/jppipa.v12i7.15673>
- Habib, A., Desky, A., & Yulastri, A. (2026). *Validity of Animated Video-Based Learning Media Development Using Adobe After Effect Application in Grade IV Elementary School*. 12(2), 507–514. <https://doi.org/10.29303/jppipa.v12i2.10424>
- Irfan, D., Wahyuni, T. S., Hadi, A., & Arrasyidi, A. H. (2025). *The Effect of Gamification in Computer Science Learning on Student Motivation and Learning Outcomes at SMP Negeri 27 Padang*. 11(9), 957–966. <https://doi.org/10.29303/jppipa.v11i9.12543>
- Kartini, R., Irfan, D., Giatman, M., Wahyuni, T. S., Habib, A., & Desky, A. (2026). *The Effect of Literacy and Numeracy Skills and Field Work Experience on Employment Readiness Through Self-Efficacy Among Students at State Vocational High Schools in Batam*. 12(8), 268–277. <https://doi.org/10.29303/jppipa.v12i8.15780>

- Masriani, M., Syah, N., Waskito, W., Rukun, K., Habib, A., & Desky, A. (2026). *Lentera Negeri Development of applied physics instructional materials for the technology and engineering specialization*. 7(1), 1389–1402.
- Ningsih, W., Zen, Z., J, F. Y., Mirshad, E., & Arrasyidi, A. H. (2025). *The Effect of the Application of BSCS 5E Instructional Design on Communication Skills and Student Learning Outcomes in Physics Subjects at SMAN 16 Batam*. 11(10), 372–381.
- Padang, U. N. (2023). *The effectiveness of flipbook-based e-modules in increasing student creativity in nail art subject in higher education*. 13(2), 158–168.
- Pebrianti, L., Giatman, M., Habib, A., & Desky, A. (2026). *Effects of Project-Based Learning (PjBL) Model on Learning Outcomes in Electrical Engineering Drawing*. 12(8), 278–288. <https://doi.org/10.29303/jppipa.v12i8.15830>
- Risna, M., Arwizet, K., Habib, A., & Desky, A. (2026). *Development of an Electronic Job Sheet for Forward-Reverse Circuits in The Electrical Installation Technology Program*. 12(5), 286–295. <https://doi.org/10.29303/jppipa.v12i5.15267>
- Sari, N., Wulansari, R. E., Dewi, I. P., Habib, A., Desky, A., & Sari, N. (2026). *The Effect of Android-Based Learning and Learning Motivation on Learning Outcomes in Computer Science in the 10th Grade at SMK Negeri 1 Sumatera Barat*. 12(6), 260–266. <https://doi.org/10.29303/jppipa.v12i6.15001>
- Sudianti, N., J, F. Y., Zen, Z., Mirshad, E., Arrasyidi, A. H., & Sudianti, N. (2025). *The Effectiveness of Using Chemistry Literacy-Based Learning Videos on the Problem-Solving Ability of Grade X Students at SMA Negeri 16 Batam*. 11(10), 382–388. <https://doi.org/10.29303/jppipa.v11i10.12182>
- Taali, Desky, A. H. A., Pratama, A. J., & Setiawan, H. (2024). Effectiveness of Blended Learning Model in Microprocessor Course with Google Classroom. *Jurnal Penelitian Pendidikan IPA*, 10(7), 3674–3680. <https://doi.org/10.29303/jppipa.v10i7.7754>
- Vaesar, S. S., Giatman, M., Rizal, F., Habib, A., & Desky, A. (2026). *The Effect of PjBL Model Assisted by Revit Application on Students ' Building Drawing Learning Outcomes in the DPIB Department at SMK Negeri 4 Palembang*. 12(5), 183–193. <https://doi.org/10.29303/jppipa.v12i5.15181>
- Virnindo, A., Yustisia, H., Hidayat, H., Hidayat, N., Habib, A., & Desky, A. (2026). *Evaluation of Competency-Based Learning at Vocational High School Using the CIPP Model*. 12(5), 104–113. <https://doi.org/10.29303/jppipa.v12i8.15824>