



Development of Digital Learning Materials Based on Project-Based Learning Using CorelDRAW and Blender to Enhance Graphic Design and 3D Animation Skills

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Abstract: This study aims to develop digital learning media based on Project-Based Learning (PBL) that integrates CorelDRAW and Blender software to enhance students' graphic design and 3D animation competencies in the Electrical Engineering Education program. The development of this media is motivated by the lack of project-based interactive teaching materials in the fields of graphic design and 3D animation in vocational education. The research method used is Research and Development (R&D) with the 4D development model (define, design, develop, disseminate). The research subjects were 60 students in the Electrical Engineering Education study program, divided into an experimental class (n = 30) and a control class (n = 30). Data were collected through validation sheets, teacher and student response questionnaires, and pretest and posttest assessments. Data analysis techniques used included Aiken's V for validity, percentage for practicality, the N-Gain test, the Shapiro-Wilk normality test, Levene's homogeneity test, and the independent-samples t-test for effectiveness. The validity test results indicated that the media was valid, with media aspect and content aspect scores of 0.897 and 0.972, respectively. The practicality test results showed an average score of 95.17% from faculty responses and 94.12% from student responses, both falling into the "very practical" category. In the effectiveness test, the N-Gain for the experimental class was 0.71 (moderate-high), and the t-test showed Sig. (2-tailed) value of 0.000 with a calculated t-value of 4.312 > the critical t-value, indicating a significant difference in learning outcomes between the class using this medium and the control class. Thus, the CorelDRAW- and Blender-based PjBL digital learning media have been proven to be valid, practical, and effective as an alternative 21st-century teaching material in vocational education.

Keywords: Blender; CorelDRAW; Digital learning media; Graphic design and 3D animation; Project-based learning

Introduction

Vocational education is expected to produce graduates whose competencies align with the demands of industry, particularly in the rapidly growing fields of graphic design and 3D animation driven by digital transformation. However, the learning process in these areas still faces several challenges, including the limited

availability of interactive learning media, low student engagement in practical activities, and the underutilization of industry-standard software such as CorelDRAW and Blender in project-oriented learning. These challenges hinder the development of students' vocational competencies, particularly their ability to create graphic design and 3D animation products that

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meet industry standards and workforce expectations (Yang, 2023).

To address these issues, it is necessary to develop a digital learning media based on PjBL that integrates the use of CorelDRAW and Blender. The proposed learning media is designed to facilitate both conceptual understanding and practical skill development through authentic, project-oriented learning activities. By implementing digital learning media based on PjBL, students are expected to enhance their competencies in graphic design and 3D animation, strengthen their creativity and problem-solving skills, and produce digital products that are relevant to the needs of the creative industry (Rizkylillah et al., 2025, Desky et al., 2025a).

However, preliminary observations conducted at SMKN 1 Ampek Nagari revealed several challenges in the teaching and learning process of graphic design and 3D animation. The results of questionnaires and interviews with vocational teachers indicated that approximately 78% of students experienced difficulties in using advanced features of Blender, particularly in 3D object modeling and rendering processes. In addition, around 67% of students were unable to independently produce graphic design and 3D animation projects that met the established learning assessment criteria. The observations also showed that nearly 82% of classroom instruction still relied on conventional presentation media, resulting in limited student engagement in practical activities and project-based tasks (Sukmawati et al., 2024).

These conditions have hindered the development of students' vocational competencies, particularly in mastering graphic design and 3D animation skills that are aligned with the demands of the digital creative industry. To address these challenges, there is a need to develop digital learning media based on PjBL that integrates the use of CorelDRAW and Blender. The proposed learning media is expected to provide a more interactive, contextual, and project-oriented learning environment, thereby enhancing student engagement, strengthening practical skills, and improving vocational competencies in graphic design and 3D animation (Desky & Yulastri, 2026).

In response to these challenges, PjBL has emerged as one of the most effective pedagogical approaches for vocational education, as it promotes active learning through the completion of authentic and industry-relevant projects. Unlike conventional teacher-centered instruction, PjBL positions students as active participants who are responsible for planning, developing, and evaluating project outcomes both independently and collaboratively. This approach has been widely recognized for its ability to enhance learning motivation, creativity, critical thinking,

problem-solving abilities, communication skills, and self-directed learning, which are essential competencies for success in the modern workforce (Risna et al., 2026). Furthermore, PjBL enables students to bridge the gap between theoretical knowledge and practical application by engaging in real-world tasks that reflect professional practices within the creative industry (Ningsih et al., 2025).

The integration of Project-Based Learning into digital learning media offers significant potential to create a more interactive, student-centered, and meaningful learning environment. Through the incorporation of project-oriented activities using industry-standard software such as CorelDRAW and Blender, students can actively construct knowledge while simultaneously developing technical and professional competencies required in graphic design and 3D animation. Consequently, digital learning media based on PjBL not only facilitates the acquisition of technical skills but also fosters higher-order thinking skills and workplace readiness, making it a highly relevant solution for strengthening vocational competencies in the era of digital transformation (Roemintoyo & Budiarto, 2023).

CorelDRAW is a vector-based graphic design software widely utilized in the creative industry for digital illustration, branding, advertising, and print media production due to its flexibility and professional design capabilities (Ermawalis et al., 2025). Meanwhile, Blender is a powerful open-source software that supports a wide range of 3D content creation activities, including modeling, texturing, animation, rendering, visual effects, and physical simulations (Sudianti et al., 2025). As industry-standard tools, both applications play a significant role in preparing students with the technical competencies required in the rapidly evolving digital creative sector (Desky et al., 2026b).

Despite their extensive adoption in professional practice, the integration of CorelDRAW and Blender into vocational learning environments remains limited. Existing instructional practices often focus on software operation and procedural training rather than engaging students in authentic, project-oriented learning experiences that reflect real industry workflows. Consequently, students frequently develop fragmented technical skills without fully understanding how to apply them in solving complex design problems or producing industry-relevant digital products. Therefore, integrating CorelDRAW and Blender within Project-Based Learning (PjBL)-based digital learning media offers a promising approach to bridging the gap between vocational education and industry expectations by fostering both technical proficiency and higher-order competencies through authentic project development (Ayuriyanti & Surjono, 2023).

Several previous studies have highlighted the effectiveness of PjBL-based digital learning media in improving student engagement, learning outcomes, and vocational competencies. For instance, Risna et al. (2026) reported that web-based simulation learning significantly enhanced students' conceptual understanding and academic performance. Nabilah & Ulya (2025) demonstrated that a blended learning model supported by Google Classroom effectively improved student participation and learning achievement in Microprocessor courses. These findings indicate that the integration of digital learning technologies with student-centered instructional approaches can substantially enhance the quality of vocational education.

Despite these promising developments, existing studies have primarily focused on the implementation of digital learning platforms, simulations, or blended learning environments, with limited attention given to the development of integrated digital learning media for graphic design and 3D animation. In particular, research examining the integration of CorelDRAW and Blender within a single PjBL-based digital learning module remains scarce. This gap is significant because both applications represent essential industry-standard tools that support complementary competencies in graphic design and 3D content creation. Therefore, the development of an integrated PjBL-based digital learning media that combines CorelDRAW and Blender offers a novel contribution to vocational education by providing students with authentic, project-oriented learning experiences aligned with the demands of the digital creative industry (Suprihatin et al., 2025).

Based on the identified problems and research gaps, this study aims to develop and validate a Project-Based Learning (PjBL)-based digital learning media that integrates CorelDRAW and Blender into a comprehensive instructional environment for graphic design and 3D animation learning. The developed media is intended to facilitate authentic and project-oriented learning experiences that enable students to develop technical competencies alongside essential twenty-first-century skills, including creativity, critical thinking, collaboration, and problem-solving. Recent studies have demonstrated that PjBL effectively enhances students' creativity, critical thinking, learning engagement, and vocational competencies by connecting theoretical concepts with real-world projects and industry-oriented tasks (Irfan et al., 2025). Therefore, integrating PjBL into digital learning media has the potential to create a more meaningful, student-centered, and competency-based learning environment (Lesman et al., 2023).

This study contributes to vocational education by addressing the limited availability of integrated digital learning media that combine graphic design and 3D

animation software within a single Project-Based Learning framework. The novelty of this research lies in the integration of CorelDRAW and Blender into a unified digital learning platform that supports end-to-end project development, from graphic design creation to 3D modeling and animation production. It is expected that the developed media will improve students' vocational competencies, strengthen their readiness for the digital creative industry, and foster the development of higher-order thinking skills required in the twenty-first-century workforce. Furthermore, the proposed learning media is expected to serve as an innovative instructional solution that bridges the gap between vocational education and industry demands in the era of digital transformation (Lahinta et al., 2024).

Method

This study employed a Research and Development (R&D) approach using the Four-D (4D) development model, which consists of four sequential phases: Define, Design, Develop, and Disseminate (Sugiyono, 2019). The 4D model was selected because it provides a systematic, structured, and iterative framework for developing educational products that meet both pedagogical and user requirements. Furthermore, the model has been widely adopted in educational and vocational research due to its effectiveness in producing learning media that are valid, practical, and effective for classroom implementation.

The implementation of the 4D model enables a comprehensive and systematic development process, beginning with the identification of learning needs, instructional problems, learner characteristics, curriculum requirements, and industry expectations during the define phase. This stage is crucial for ensuring that the developed learning media addresses actual challenges encountered in graphic design and 3D animation learning. Furthermore, the analysis conducted at this phase serves as the foundation for determining appropriate learning objectives, content structures, and project activities that align with vocational competencies and industry demands (Hanif & Abdurrahman, 2024).

The design and develop phases focus on the creation and refinement of the Project-Based Learning (PjBL)-based digital learning media integrating CorelDRAW and Blender. During these stages, learning materials, project activities, instructional components, and assessment instruments are systematically designed and developed to facilitate active and meaningful learning experiences. The product is subsequently subjected to expert validation and revision processes to ensure the accuracy of content, instructional quality, media usability, and technical functionality. In addition,

field testing is conducted to evaluate the practicality and effectiveness of the developed media in supporting students' learning and improving their competencies in graphic design and 3D animation (Ahmad et al., 2023).

The disseminate phase aims to promote the utilization of the developed media in broader vocational education contexts. Through a series of validation, testing, and dissemination activities, the 4D model ensures that the resulting product is valid, practical, and effective for instructional implementation. Therefore, the 4D model is considered highly suitable for developing a PjBL-based digital learning media that integrates CorelDRAW and Blender, as it not only supports the acquisition of technical skills but also fosters creativity, collaboration, critical thinking, and problem-solving abilities required in the digital creative industry and the twenty-first-century workforce (Ulum et al., 2025).

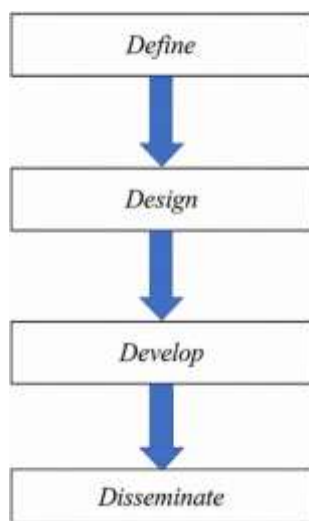


Figure 1. Model 4D

Define

The Define stage aimed to identify instructional needs and establish the foundation for developing the proposed digital learning media. This stage involved needs analysis, learner analysis, concept analysis, and learning objective formulation through classroom observations, interviews with teachers, and a review of learning resources at SMKN 1 Ampek Nagari. The findings revealed that graphic design and 3D animation learning was still dominated by teacher-centered instruction, supported primarily by presentation slides and conventional teaching materials. Although CorelDRAW and Blender had been introduced in classroom activities, students experienced difficulties in applying the acquired knowledge to complete authentic design and animation projects. Furthermore, the absence of integrated digital learning media limited students' opportunities to learn independently, practice

systematically, and develop industry-relevant products (Haq & Adiwati, 2024; Fiona et al., 2025).

The analysis also indicated that the implementation of Project-Based Learning (PjBL) had not been optimally supported by instructional media capable of guiding students through the complete project development process, from concept design to final product creation (Desky et al., 2025b). As a result, students' engagement, creativity, and vocational competencies in graphic design and 3D animation remained below the expected level. Considering the increasing demand for digital creative skills in the industrial sector, there is a critical need to develop a PjBL-based digital learning media integrating CorelDRAW and Blender. Such media is expected to provide authentic learning experiences, strengthen higher-order thinking skills, and enhance students' vocational competencies in accordance with the needs of the digital creative industry and twenty-first-century workforce (Putri & Rohmani, 2024).

Design

At the Design stage, the initial prototype of the digital learning media was systematically developed based on the findings obtained during the needs analysis phase. The design process focused on creating an instructional framework that integrates Project-Based Learning (PjBL) principles with graphic design and 3D animation learning using CorelDRAW and Blender. The prototype consisted of four main components: a user-friendly application interface designed to facilitate navigation and learning interactions; a structured content map covering CorelDRAW and Blender materials aligned with the intended learning outcomes and vocational competency standards; a sequence of project-based learning activities organized according to the PjBL syntax to guide students through authentic project completion; and assessment instruments in the form of pre-tests and post-tests to measure students' learning achievement and competency improvement (Vaesar et al., 2026).

Particular emphasis was placed on ensuring that the learning media supported active learning, independent exploration, and project development processes. As illustrated in Figure 2, the developed media provides integrated learning features, including learning modules, interactive quizzes, project-based assignments, and progress monitoring tools that enable students to track their learning performance. The project activities were designed to simulate real-world practices in graphic design and 3D animation, allowing students to apply theoretical knowledge to authentic tasks using industry-standard software. This approach was intended to enhance learning engagement while fostering creativity, critical thinking, collaboration, and problem-solving skills (Deviana et al., 2025).

To ensure broad accessibility and usability across different devices and operating systems, the learning media was developed using Adobe Animate and exported into HTML5 format. This technological approach allows students to access learning materials through web-based platforms without requiring

specialized software installation. Consequently, the developed media not only supports flexible and interactive learning experiences but also aligns with current trends in digital vocational education and the growing demand for technology-enhanced learning environments (Priyana et al., 2025).

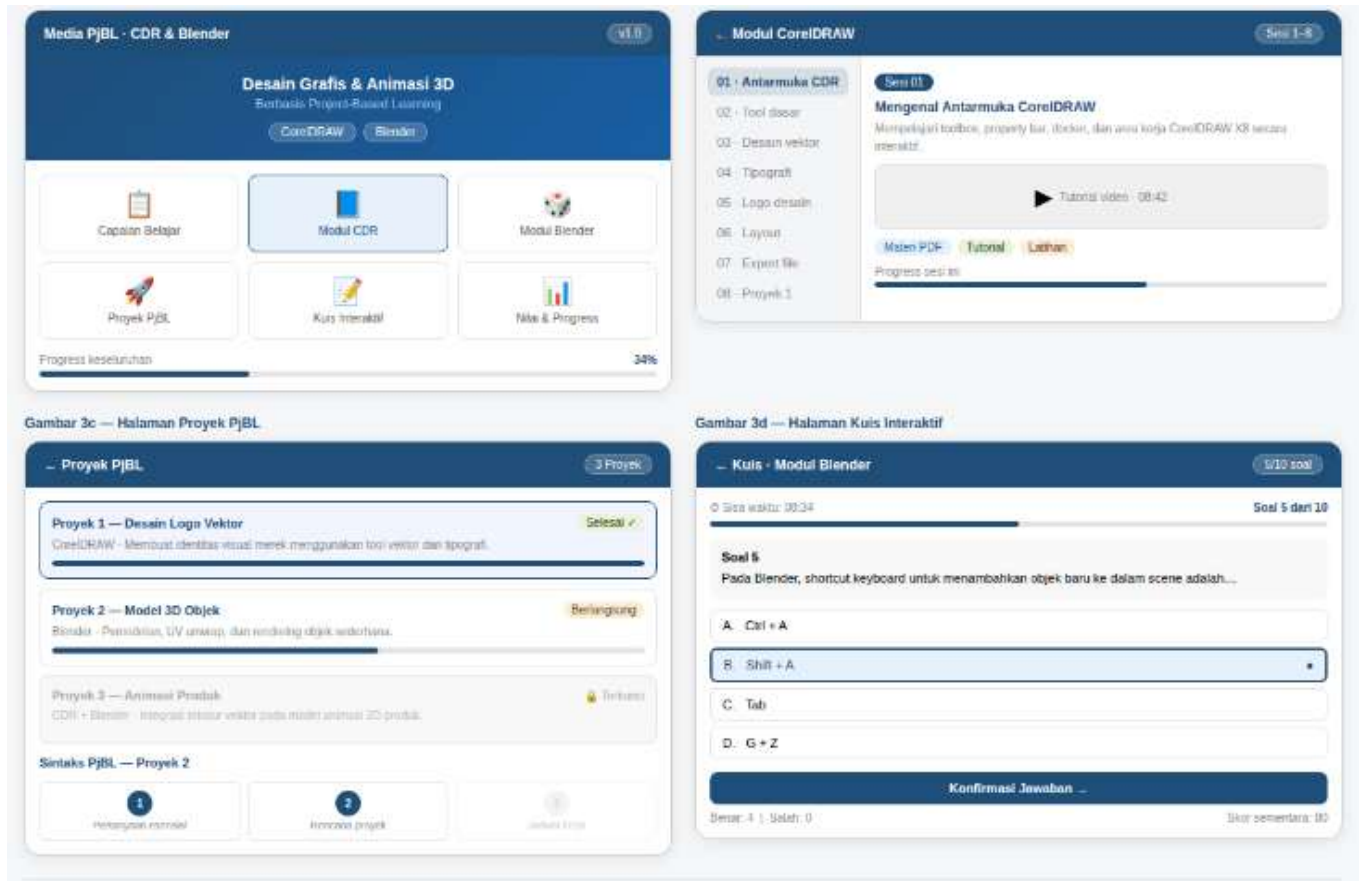


Figure 2. Media display mockup

Develop

The Develop stage focused on producing and evaluating the quality of the developed digital learning media. The product was validated by two media experts and three subject-matter experts from the Department of Electrical Engineering, Universitas Negeri Padang. The validation process assessed content quality, instructional design, media presentation, technical functionality, and the integration of Project-Based Learning (PjBL) principles. Data were collected using a five-point Likert scale questionnaire and analyzed using Aiken's V coefficient to determine the validity of the developed media. Based on the experts' feedback and recommendations, revisions were made to improve the quality and suitability of the product before implementation (Mardiana et al., 2026).

After the revision process, practicality testing was conducted involving teachers and students of SMKN 1 Ampek Nagari to evaluate the usability, attractiveness,

and ease of implementation of the learning media. Subsequently, the effectiveness of the media was examined using a quasi-experimental pretest-posttest control group design involving an experimental class and a control class. The experimental group used the PjBL-based digital learning media integrating CorelDRAW and Blender, while the control group received conventional instruction. The results of the effectiveness test were used to determine the extent to which the developed media improved students' competencies in graphic design and 3D animation, thereby ensuring that the product met the criteria of validity, practicality, and effectiveness required for vocational learning environments (Saeliang & Chatwattana, 2025).

Disseminate

The Disseminate stage focused on expanding the implementation and utilization of the developed digital

learning media in broader vocational education settings. After being declared valid, practical, and effective, the learning media was introduced to other classes within the same educational program and to partner vocational schools offering graphic design and 3D animation courses. This dissemination process aimed to increase the adoption of Project-Based Learning (PjBL)-based digital learning practices, support the development of students' vocational competencies, and provide educators with an innovative instructional resource that aligns with industry needs, curriculum objectives, and twenty-first-century learning demands (Irfan et al., 2025; Sukanti, 2025).

Data Analysis Techniques

Data analysis was conducted to evaluate the validity, practicality, and effectiveness of the developed digital learning media. The validity of the product was assessed by two media experts and three subject-matter experts using a five-point Likert scale validation instrument. The collected data were analyzed using Aiken's V coefficient, with a minimum validity threshold of 0.666 indicating that the media met the required content validity criteria. Practicality testing was conducted with teachers and students of SMKN 1 Ampek Nagari through response questionnaires measuring ease of use, usability, attractiveness, and instructional support. The practicality score was interpreted using percentage criteria, where scores of $\geq 85\%$ were categorized as very practical, 70–84% as practical, and 55–69% as moderately practical (Lafifa & Rosana, 2023).

The effectiveness of the developed media was evaluated using a quasi-experimental pretest-posttest control group design involving students from SMKN 1 Ampek Nagari. Students in the experimental group learned using the Project-Based Learning (PjBL)-based digital learning media integrating CorelDRAW and Blender, while those in the control group received conventional instruction. Learning outcomes were measured using pretest and posttest instruments designed to assess competencies in graphic design and 3D animation. Improvement in student achievement was determined using the N-Gain Score, which was classified into high (≥ 0.70), moderate (0.30–0.69), and low (< 0.30) categories. Prior to hypothesis testing, data normality and homogeneity were examined using the Shapiro-Wilk and Levene tests, respectively. An independent samples t-test at a significance level of $\alpha = 0.05$ was then performed to determine whether there were statistically significant differences in learning outcomes between the experimental and control groups (Hapsanto, 2026).

Result and Discussion

Define

The preliminary observation conducted at SMKN 1 Ampek Nagari revealed several challenges in the implementation of Graphic Design and 3D Animation learning. The learning process was still predominantly teacher-centered, relying on direct instruction, demonstrations, and presentation slides as the primary instructional resources. As a result, students often experienced difficulties in independently revisiting learning materials and applying acquired knowledge to project completion outside classroom hours. Furthermore, the absence of integrated digital learning media limited students' opportunities to engage in self-directed learning and practice the use of industry-standard software such as CorelDRAW and Blender in a structured manner. A needs assessment survey indicated that 88% of students required project-based learning media that could be accessed independently anytime and anywhere, while 92% expressed strong interest in interactive digital learning media integrating tutorials, practical exercises, and guided project activities (Sari et al., 2026).

The learner analysis further showed that all students had access to laptops or computers capable of running CorelDRAW and Blender, indicating a favorable technological environment for the implementation of digital learning media. These findings highlight the need for an innovative learning solution that supports flexible, interactive, and project-oriented learning experiences. Therefore, a Project-Based Learning (PjBL)-based digital learning media was designed and developed using HTML5 technology, enabling students to access learning materials through a web browser without requiring an internet connection. This approach allows students to learn independently, revisit instructional content, and complete graphic design and 3D animation projects at their own pace, thereby supporting the development of vocational competencies aligned with the demands of the digital creative industry (Arwizet et al., 2026).

Based on the results of the needs analysis, a Project-Based Learning (PjBL)-based digital learning media was systematically designed to support the development of vocational competencies in Graphic Design and 3D Animation at SMKN 1 Ampek Nagari. The developed media consists of several integrated components, including a main menu, learning outcomes and competency indicators page, learning materials page, project implementation page, interactive quiz page, and project evaluation page. The learning materials are organized into two major modules, namely the CorelDRAW module and the Blender module, which are structured according to curriculum learning outcomes

and industry competency requirements. To facilitate independent learning, each module incorporates multimedia elements such as explanatory texts, screenshots, illustrations, animations, and embedded video tutorials that provide step-by-step guidance for completing design and animation tasks (Desky et al., 2026a).

The instructional design of the media adopts the Project-Based Learning (PjBL) framework to promote active, student-centered, and authentic learning experiences. The learning process is organized into six sequential stages: determining an essential question; designing the project plan; developing a project schedule; monitoring project progress; testing and presenting project outcomes; and evaluating learning experiences (Chen & Yang, 2019; Farshad & Fortin, 2026). Through these stages, students are encouraged to apply theoretical knowledge to real-world design and animation projects using CorelDRAW and Blender. This approach not only supports the acquisition of technical skills but also fosters creativity, critical thinking, collaboration, communication, and problem-solving abilities, which are essential competencies for success in the digital creative industry and the twenty-first-century workforce (Nuralita et al., 2025).

The project module was designed to facilitate the gradual development of students' competencies through a series of authentic and industry-oriented learning activities. Three sequential projects were incorporated into the learning media: vector logo design using CorelDRAW; basic 3D object modeling using Blender; and integrated product animation development by applying graphic assets created in CorelDRAW as textures for Blender-generated 3D models. The projects were structured progressively, allowing students to build foundational skills before advancing to more complex tasks (Dewi et al., 2022). This approach not only supports the mastery of technical competencies but also promotes creativity, critical thinking, and problem-solving skills through real-world project experiences aligned with the needs of the digital creative industry.

The Develop stage focused on evaluating and refining the quality of the developed learning media through expert validation. The validation process involved five validators consisting of two media experts and three subject-matter experts. Several aspects were assessed, including content accuracy, instructional design, visual appearance, media usability, technical functionality, and the integration of Project-Based Learning (PjBL) principles. Feedback and recommendations provided by the validators were used to improve the product before implementation. The results of the media and content validation are presented in Tables 1 and 2, indicating the extent to which the developed learning media met the required standards of

validity for vocational education (Prameswari, 2019; Farizi et al., 2020).

Table 1. Results of media expert validation

Assessment Criteria	Average Validator Score	Category
Presentation Design	0.912	Valid
Ease of Use	0.895	Valid
Interactive Features	0.879	Valid
Language and Readability	0.901	Valid

As presented in Table 1, the results of the media expert validation indicate that all assessed aspects achieved Aiken's V values above the minimum validity threshold of 0.666, confirming that the developed digital learning media is valid for instructional use. The highest score was obtained in the Presentation Design aspect ($V = 0.912$), followed by Language and Readability ($V = 0.901$), Ease of Use ($V = 0.895$), and Interactive Features ($V = 0.879$). These findings demonstrate that the media possesses an attractive visual design, clear and understandable content, user-friendly navigation, and effective interactive components that support student engagement. Overall, the validation results indicate that the Project-Based Learning (PjBL)-based digital learning media integrating CorelDRAW and Blender meets the required quality standards and is suitable for further practicality and effectiveness testing in vocational learning environments (Wahyuningtyas et al., 2024).

Table 2. Results of the subject matter expert validation

Assessment Criteria	Average Validator Score	Category
Content Appropriateness	0.921	Valid
Content Depth	0.967	Valid
PjBL Relevance	0.978	Valid
Independent Learning	0.985	Valid
E-Module Components	0.989	Valid
PjBL Approach	0.993	Valid

As presented in Table 2, the results of the subject matter expert validation demonstrate that all evaluated aspects achieved Aiken's V values above the minimum validity threshold of 0.666, indicating a high level of content validity. The highest score was obtained for the PjBL Approach aspect ($V = 0.993$), followed by E-Module Components ($V = 0.989$), Independent Learning ($V = 0.985$), PjBL Relevance ($V = 0.978$), Content Depth ($V = 0.967$), and Content Appropriateness ($V = 0.921$). These findings indicate that the developed learning media is highly aligned with curriculum objectives, adequately covers the required competencies in graphic design and 3D animation, and effectively incorporates Project-Based Learning principles to support active and student-centered learning. Furthermore, the high scores for Independent Learning and E-Module Components

suggest that the media provides well-structured learning materials and learning activities that facilitate self-directed learning. Overall, the validation results confirm that the developed PjBL-based digital learning media integrating CorelDRAW and Blender is highly (Mahendra et al., 2023).

Table 3. Validity level categories

Achievement Level	Category
0-0.666	Invalid
≥ 0.666	Valid

Table 3 presents the validity level categories used to interpret the results of the expert validation. Based on Aiken’s V coefficient, a score ranging from 0 to 0.666 is categorized as invalid, indicating that the evaluated component does not sufficiently meet the required quality standards and requires substantial revision. In contrast, a score equal to or greater than 0.666 is categorized as valid, indicating that the component meets the established validity criteria and is appropriate for implementation in the learning process. These criteria were used as the benchmark for determining the validity of the developed Project-Based Learning (PjBL)-based digital learning media integrating CorelDRAW and Blender, ensuring that the product satisfies the necessary content, instructional, and media quality standards before proceeding to practicality and effectiveness testing (Sarwandi et al., 2019).

Table 3 presents the validity criteria used to interpret the expert validation results based on Aiken’s V coefficient. A score below 0.666 indicates that the evaluated component does not meet the required quality standards and therefore requires substantial revision, whereas a score of 0.666 or higher is categorized as valid, indicating that the component is appropriate for instructional implementation. These validity criteria served as the benchmark for assessing the quality of the developed Project-Based Learning (PjBL)-based digital learning media, ensuring that the product met the required standards of content accuracy, instructional design, and media quality before proceeding to practicality and effectiveness testing.

Development Phase

The practicality of the developed digital learning media was evaluated through response questionnaires administered to three teachers and 30 students who participated in the trial implementation. The practicality assessment aimed to determine the usability, ease of navigation, accessibility, attractiveness, and overall usefulness of the media in supporting the learning process. By involving both teachers and students as end users, the evaluation provided comprehensive insights into the extent to which the media could facilitate project-based learning activities and support the development of graphic design and 3D animation competencies. The results of the practicality assessment are presented in Table 4.

Table 4. Practical findings from the faculty and student feedback survey

Indicator	Percentage % Teacher Assessment	Practicality Criteria	Percentage % Student Assessment	Practicality Criteria
Technical	97.50	Very Practical	96.20	Very Practical
Effectiveness	96.67	Very Practical	95.80	Very Practical
Design	94.17	Very Practical	93.40	Very Practical
Relevance	91.67	Very Practical	90.50	Very Practical
Use of Media	95.83	Very Practical	94.70	Very Practical
Average (%)	95.17	Very Practical	94.12	Very Practical

The practicality assessment results demonstrate that the developed PjBL-based digital learning media integrating CorelDRAW and Blender achieved a very high level of usability and acceptance among users, obtaining an average score of 95.17% from teachers and 94.12% from students, both categorized as very practical. The highest score from teachers was recorded in the technical aspect (97.50%), indicating that the media functions reliably, is easy to operate, and can be implemented without significant technical difficulties. Meanwhile, students rated the effectiveness aspect the highest (95.80%), reflecting their perception that the media effectively facilitates learning, enhances understanding of graphic design and 3D animation concepts, and supports the completion of project-based

tasks. Overall, these findings confirm that the developed learning media is user-friendly, technically robust, and highly capable of supporting active, independent, and project-oriented learning, thereby contributing to the improvement of vocational competencies in graphic design and 3D animation (Hananto, 2024).

Develop

The effectiveness of the developed digital learning media was evaluated using a quasi-experimental pretest-posttest control group design involving 60 students, who were divided equally into an experimental group and a control group. The experimental group received instruction using the Project-Based Learning (PjBL)-based digital learning

media integrating CorelDRAW and Blender, while the control group participated in conventional learning activities. This research design was employed to rigorously examine the impact of the developed media on students' competencies in graphic design and 3D animation by comparing learning outcomes between the two groups. Prior to hypothesis testing, prerequisite analyses were conducted through normality and homogeneity tests to ensure that the data met the assumptions required for subsequent parametric statistical analyses, thereby enhancing the validity and reliability of the research findings (Pramuaji & Munir, 2017).

Table 5. Normality tests for pre-test and post-test data from the experimental and control groups

Class	Data	Statistic	df	Sig.
Experiment	Pre-test	0.951	30	0.182
	Post-test	0.943	30	0.108
Control	Pre-test	0.956	30	0.240
	Post-test	0.961	30	0.325

The results of the normality test are presented in Table 5. The Shapiro–Wilk test was employed to determine whether the pre-test and post-test data from both the experimental and control groups were normally distributed. As shown in the table, all significance values exceeded the threshold of 0.05, with values of 0.182 and 0.108 for the experimental group's pre-test and post-test, respectively, and 0.240 and 0.325 for the control group's pre-test and post-test. These results indicate that the data in both groups follow a normal distribution and satisfy the assumptions required for parametric statistical analysis. Therefore, the dataset was considered appropriate for further analysis using inferential statistical procedures, including the independent samples t-test, to evaluate the effectiveness of the developed PjBL-based digital learning media integrating CorelDRAW and Blender. The fulfillment of the normality assumption also strengthens the reliability and validity of the subsequent statistical findings regarding the impact of the developed media on students' competencies in graphic design and 3D animation (Setiyawan et al., 2024).

Table 6. Test of homogeneity for the experimental and control groups

Score	Levene Statistic	df1	df2	Sig.
Pre-test	0.876	1	18	0.362
Post-test	0.143	1	18	0.711

As presented in Table 5, all significance values obtained from the Shapiro–Wilk normality test exceeded 0.05, indicating that the pre-test and post-test data for both the experimental and control groups were normally

distributed. Furthermore, the results of the Levene homogeneity test shown in Table 6 yielded significance values of 0.362 for the pre-test and 0.711 for the post-test, both of which were greater than 0.05. These findings confirm that the data variances between the two groups were homogeneous. Since the assumptions of normality and homogeneity were satisfied, the data were deemed suitable for further analysis using an independent samples t-test to determine the effectiveness of the developed PjBL-based digital learning media.

Table 7. Result of independent sample t-test

Independent Samples Test	F	Sig. (2-tailed)	t	df
Equal Variances Assumed	0.143	0.000	4.312	58
Equal Variances Not Assumed		0.000	4.312	57.43

Based on Table 7, the Sig. (2-tailed) value of 0.000 < 0.05 and the calculated t-value of 4.312 > the critical t-value indicate a significant difference between the learning outcomes of the experimental class and the control class. The experimental class's N-Gain reached 0.71 (moderate-high category), higher than the control class, which achieved an N-Gain of 0.54. This proves that the use of PjBL-based digital learning media using CorelDRAW and Blender significantly improves students' graphic design and 3D animation competencies.

Discussion

This study successfully developed a Project-Based Learning (PjBL)-based digital learning media integrating CorelDRAW and Blender to support the learning of graphic design and 3D animation. The integration of these industry-standard applications provides students with authentic learning experiences that bridge theoretical knowledge and practical skills through project-oriented activities. Developed using the 4D model, the resulting product demonstrated a high level of validity, practicality, and effectiveness based on expert validation, user responses, and learning outcome assessments. These findings indicate that the developed media is a feasible and effective instructional tool for enhancing students' vocational competencies, while also supporting the implementation of student-centered and industry-oriented learning in vocational education (Ojo, 2026).

The high validity scores (0.897 for the media aspect and 0.972 for the content aspect) indicate that the content presented aligns with the established learning outcomes and meets the quality standards for interactive learning media. This finding aligns with the research by Lahinta et al. (2024), who developed media using APK 2 Builder and achieved high validity scores due to the alignment between the media design and instructional objectives.

The high content validity scores, particularly regarding the PjBL approach, confirm that the designed projects authentically reflect the PjBL framework, from posing essential questions to evaluating project outcomes (Firdaus & Harjono, 2024).

The practicality of the platform, as indicated by over 94% of responses from both faculty and students, demonstrates that it is easy to use without significant technical barriers. The ease of offline access is a key advantage appreciated by users, given the limited internet connectivity in some computer labs. This is consistent with the findings of Hingide et al. (2021), who concluded that platform-based media is more efficient and affordable than internet-based e-learning in the context of vocational laboratories.

The effectiveness of the developed learning media was demonstrated by an N-Gain score of 0.71 in the experimental group, which was categorized as high and significantly higher than that of the control group ($t = 4.312$; $p < 0.05$). This improvement indicates that the integration of Project-Based Learning (PjBL), CorelDRAW, and Blender effectively enhanced students' competencies in graphic design and 3D animation. These findings are consistent with previous studies reporting that PjBL promotes active learning, improves learning outcomes, and strengthens vocational competencies through authentic project-based (Tananda et al., 2026).

This study has both practical and theoretical implications for vocational education, particularly at SMKN 1 Ampek Nagari. Practically, the developed PjBL-based digital learning media integrating CorelDRAW and Blender can be utilized as an innovative instructional resource to support graphic design and 3D animation learning, providing students with more interactive, flexible, and industry-oriented learning experiences compared to conventional teaching methods. The media enables students to develop technical skills through authentic project activities that reflect real-world practices in the digital creative industry. Theoretically, this study reinforces the argument that the integration of Project-Based Learning (PjBL) with industry-standard software constitutes an effective pedagogical approach for enhancing vocational competencies, promoting higher-order thinking skills, and bridging the gap between school-based learning outcomes and the competency requirements of the digital creative industry (Taali et al., 2024).

Conclusion

This study successfully developed a digital learning medium based on Project-Based Learning that integrates CorelDRAW and Blender to enhance the graphic design and 3D animation competencies of vocational

engineering education students. The developed medium includes content modules, video tutorials, interactive quizzes, and phased project assignments that can be accessed offline via a web browser. Based on the research results, the following three conclusions can be drawn: The media was deemed valid by media experts (average Aiken's $V = 0.897$) and content experts (average Aiken's $V = 0.972$); The media was rated as highly practical, with an average score of 95.17% from faculty and 94.12% from students; The media proved effective in enhancing student competencies, with an experimental N-Gain of 0.71 higher than the control group, and a statistically significant difference ($p < 0.05$). Despite the promising findings, this study has several limitations that should be acknowledged. The implementation and evaluation of the developed learning media were conducted only at SMKN 1 Ampek Nagari, which may limit the generalizability of the findings to other vocational schools with different student characteristics, learning environments, and technological infrastructures. Therefore, caution should be exercised when applying the results to broader educational contexts. Future studies are recommended to expand the implementation of the developed media to different vocational schools, study programs, and educational levels in order to further examine its effectiveness and scalability. In addition, integrating emerging technologies such as adaptive learning, artificial intelligence, and augmented reality could enhance the interactivity and personalization of the learning experience. Longitudinal studies are also needed to investigate the long-term impact of the developed media on students' vocational competencies, learning engagement, and readiness to meet the evolving demands of the digital creative industry.

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