Curricula: Journal of Curriculum Development - e-ISSN 2830-7917 & p-ISSN 2964-7339
Volume 4 No 1 (2025) 693-706

Curricula:
Journal of Curriculum Development
https://ejournal.upi.edu/index.php/CURRICULA/

Development of electrical power learning video media with project-based learning models

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ABSTRACT

Learning at Vocational High Schools, which seems monotonous, requires updates to the learning media so that students can easily understand the material. This research aims to develop learning video media based on Project-Based Learning (PjBL) in the subject of Fundamentals of Electricity Engineering in Vocational Schools. The development model used is the synthesis of three popular models (ADDIE, Four-D, and Borg and Gall) through five stages, namely analyzing the needs and characteristics of students, media design, product development, limited trials, and product evaluation. The video media was developed based on the stages of PjBL, including problem identification, planning, project implementation, and evaluation-reflection. Validation was carried out by material experts and media experts. Practicality and effectiveness were tested through student and teacher response questionnaires and a pretest-posttest. The results showed that the developed media was easy to use and interesting, as evidenced by the increase in students' learning outcomes after using the media. The developed learning media is declared feasible, practical, and effective to support learners' active involvement in project-based learning, improve their concept understanding, and creative thinking skills.

ARTICLE INFO

Article History:
Received: 21 Mar 2025
Revised: 14 Jun 2025
Accepted: 16 Jun 2025
Available online: 25 Jun 2025
Publish: 27 Jun 2025

Keywords:
electrical engineering; instructional video; project-based learning; vocational high school

Open access
Curricula: Journal of Curriculum Development is a peer-reviewed open-access journal.

ABSTRAK

Pembelajaran pada Sekolah Menengah Kejuruan (SMK) yang terkesan monoton memerlukan pembaruan pada media pembelajaran supaya peserta didik mudah memahami materi. Penelitian ini bertujuan untuk mengembangkan media video pembelajaran berbasis Project-Based Learning (PjBL) pada mata pelajaran Dasar-Dasar Teknik Ketenagalistrikan di SMK. Model pengembangan yang digunakan merupakan hasil sintesis dari tiga model populer (ADDIE, Four-D, dan Borg and Gall) melalui lima tahapan yaitu analisis kebutuhan dan karakteristik peserta didik, perancangan media, pengembangan produk, uji coba terbatas, serta evaluasi produk. Media video dikembangkan berdasarkan tahapan PjBL meliputi identifikasi masalah, perencanaan, pelaksanaan proyek, dan evaluasi-refleksi. Validasi dilakukan oleh ahli materi dan ahli media. Kepraktisan dan efektivitas diuji melalui angket respon peserta didik dan guru serta pretest–posttest. Hasil penelitian menunjukkan bahwa media yang dikembangkan mudah digunakan dan menarik dibuktikan dengan peningkatan hasil belajar peserta didik setelah penggunaan media. Media pembelajaran yang dikembangkan dinyatakan layak, praktis, dan efektif untuk mendukung keterlibatan aktif peserta didik dalam pembelajaran berbasis proyek, meningkatkan pemahaman konsep, dan keterampilan berpikir kreatif mereka.

Kata Kunci: *ketenagalistrikan; project-based learning; sekolah menengah kejuruan; video pembelajaran*

How to cite (APA 7)
Said, S., Pattaufi, P., Arnidah, A. (2025). Development of electrical power learning video media with project-based learning models. *Curricula: Journal of Curriculum Development, 4*(1), 693-706.

Peer review
This article has been peer-reviewed through the journal's standard double-blind peer review, where both the reviewers and authors are anonymised during review.

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https://doi.org/10.17509/curricula.v4i1.86702

INTRODUCTION

The use of video media in learning has a strong foundation in accordance with the latest policies that support innovation in the educational process (Yuhaeni et al., 2025). In the context of Vocational High School (SMK), this is very important because learning at SMK focuses on mastering practical skills and applicable knowledge. Learning at vocational schools has unique challenges in developing students' practical skills with a variety of subjects, both adaptive, normative, and productive. One of the productive subjects in Class X for the Electrical Power Installation Engineering major that requires creative skills is the Basics of Electrical Engineering. The learning requires students to produce real work in the field of electrical engineering. The application of video media in learning can be done to support students to visually see demonstrations of techniques, work processes, or case studies so as to facilitate their understanding of complex concepts (Sawenduling et al., 2022).

Learning videos support the Independent Curriculum by allowing learners to learn independently and at their own pace, as well as helping to visualize complex work processes, such as engineering demonstrations and industrial simulations. The Independent Curriculum at SMK emphasizes the development of 21st century skills, namely creativity, critical thinking, collaboration, and communication that can be strengthened through video media (Milala et al., 2024). Practical competence and character formation according to the Pancasila Student Profile are the main focus in the Independent Curriculum (Kusumawardani et al., 2022). Therefore, learning videos are an effective tool to improve the quality of education in vocational schools in line with the spirit of flexibility and innovation carried out by the Independent Curriculum (Nadira et al., 2022). Learning videos can be used to present practical simulations, technical steps, or work procedures in the industry, which help learners understand the application of theory in real-world situations.

Learning videos can be used as a source of reference or technical guidance in *Project-Based Learning* (PjBL)-based learning to increase student engagement and motivation (Agustini & Ngarti, 2020). When integrated with the PjBL approach, learners not only receive information from videos but also utilize this information in completing projects, such as designing electrical systems, creating technology-based products, or producing works that are relevant to the world of work (Faihah et al., 2024). This process involves critical thinking, decision-making, and direct application of knowledge (Retno, 2022). In the PjBL model, learning videos help students learn through real experiences and work collaboratively on creative projects (Adawiyah et al., 2024). A learning environment that supports exploration and problem-solving encourages learners to be more creative with videos as guides that inspire and help them produce innovative work.

PjBL-based learning video media can help students improve students' creativity and skills, especially at the vocational level. Videos allow learners to try and understand new concepts independently through clear simulations or tutorials (Rokhim et al., 2020). In addition, well-designed learning videos can reduce the burden on learners' minds so that they focus more on developing ideas and completing projects. Learning video media is effective in increasing students' understanding and engagement, especially the combination of visual and audio elements that are able to make it easier to explain difficult concepts so that they have an impact on learning outcomes (Kunrade et al., 2023). Previous research has stated that the

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use of animated videos improves the quality of learning so that students can easily understand the material (Haq & Irawati, 2022). Other research adds that learning video media can increase students' motivation and learning outcomes (Sya'ro & Dewi, 2022). Furthermore, research concludes that *youtube* as a social media with video content can be used in the learning process (Adnan & Istiqomah, 2022).

It is different from previous research that focused on the use of video as a learning medium. This research develops PjBL-based learning video media on the subject of Fundamentals of Electrical Engineering, especially for *Ohm* law material, series and parallel circuits, measurement of electric current, and how to connect electrical cables that require visualization and concrete demonstrations to make it easier to understand. This research aims to develop PBL-based learning video media in the subject of Fundamentals of Electrical Engineering in Vocational Schools through student needs identification, planning, project implementation, and evaluation-reflection. This approach is expected to improve students' critical thinking skills and creativity, especially in tasks that involve designing and developing projects such as electrical circuits. In addition, project-based learning videos provide time flexibility, allowing learners to learn independently, delve into the material, and produce relevant creative products.

LITERATURE REVIEW

Learning Video Media

Learning video media is a means used to convey subject matter through a combination of moving images and sound designed to increase interaction and understanding of the material (Pamungkas & Koeswanti, 2021). Learning video media is a medium that conveys a combination of moving images and sounds that are used to convey information or subject matter to students effectively (Aliyyah et al., 2021). Learning video media is a technology used to convey and develop students' knowledge, skills, and attitudes through interactive audio-visual content (Yuanta, 2020). Learning video media can increase students' understanding of interests, and motivation to learn in a more interesting and interactive way compared to traditional learning methods (Ammy & Wahyuni, 2020). Learning video media uses information technology to present material interactively and visually so as to help students understand lessons more effectively and interestingly (Larosa et al., 2024).

The main goal of learning video media is to increase students' understanding and interest in learning, as well as make them more active and involved in the learning process (Haidir et al., 2021). Learning video media has several important characteristics that support the learning process. First, this media is interactive because it is able to display animations, images, and sounds that enrich the learning experience so as to increase students' creativity (Rachmawati, 2020). Second, learning videos are visual by using images and videos to convey material more clearly and attractively so that it can have an impact on improving student learning outcomes (Irawan & Kurniawan, 2024). In addition, learning videos are designed to be exciting so that they can increase students' motivation to learn in a fun way (Nirmala et al., 2024). This media is easily accessible both online and *offline*, making it easier to use it in distance learning (Norma, 2021). Finally, learning video media can be

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personalized according to the needs and preferences of learners, including children with special needs, such as autism, who require a specific media approach.

Project-Based Learning **Model (PjBL)**

Project-Based Learning (PjBL) is a learning model that emphasizes the active involvement of learners in completing real projects to develop knowledge and skills (Agnevia et al., 2025). PjBL is a process-centered learning, using problems as the first step and producing projects at the end of learning (Nurhadijah et al., 2024). PjBL is a learning model that uses projects as a basis to achieve learning goals by focusing on problem solving that is the main goal (Kurniawan & Sabaruddin, 2024). PjBL as a model that uses projects as a basis in the learning process, where learning is focused on solving problems that are the main goal. Furthermore, PjBL is a very innovative learning model and emphasizes instruction according to the text through complete movements (activities) (Syawalia et al., 2023).

PjBL is a method that relies on open-ended questions to develop students' competencies. The PjBL process can bring teachers and students to new knowledge. The theories underlying PjBL include constructivism theory, which states that learners build their own knowledge through interaction with the environment and real experiences. In addition, collaborative learning theory also supports PjBL because it encourages cooperation between students in completing projects, in line with the importance of social interaction in the learning process (Athaya et al., 2024). *Problem-Based Learning* (PBL)-based learning theory is closely related to PjBL, where learners learn through involvement in solving real problems relevant to their lives (Dewi et al., 2024).

Continuous evaluation is an important element in PjBL that ensures that learning runs in accordance with project objectives. The model is designed to develop 21st century skills, including critical thinking, communication, collaboration, and creativity (Susanti et al., 2025). PjBL not only focuses on project outcomes, but also provides opportunities for the development of students' skills and understanding in facing real-world challenges. This makes PjBL a relevant, innovative, and effective learning model in shaping students who are ready to compete in the modern era.

METHODS

Research on the development of learning video media with *the Project-Based Learning* (PjBL) model in the subject of Electrical Engineering Fundamentals class XI TITL at SMK using *the Research and Development* method to design PjBL-based learning video media. SMK Negeri 6 Takalar was chosen as the research location because this school faces challenges in improving the quality of education, especially in the Department of Electrical Power Installation Engineering, where students need more interesting and effective learning innovations to develop their creative skills. This study synthesizes from three popular models, namely ADDIE, *Four-D*, and *Borg and Gall*. to conduct a critical comparison and find the most appropriate combination of approaches in producing PjBL-based learning video media that is not only feasible in content and appearance, but also contextual, tested, and easy to implement in vocational education units.

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The ADDIE model was chosen because it has flexible and interactive stages so that it is suitable for the development of video media that requires continuous revision and adjustment according to the needs of students. *The Four-D* model was chosen because it offers a simple but robust development pipeline in the early stages, particularly in needs analysis and media design, which is highly relevant to the PjBL principles that emphasize planning and problem-solving. Meanwhile, *the Borg and Gall* model was chosen because it has an in-depth research-based approach, complete with field trials and product validation, which allows the media to be comprehensively developed and ready for dissemination on a wide scale. The integration of the three resulted in five main stages in the process of developing systematic, directed, and tested learning video media as follows.

1. Needs and Characteristics Analysis Stage: refers to the analysis components of *the ADDIE* model, *Define* from *Four-D*, and *Research and Information Collecting* from *Borg and Gall*. At this stage, the researcher identifies learning needs, reviews the curriculum, maps the characteristics of students, and explores problems and needs in the field through observation, teacher interviews, and literature studies. The information obtained is the basis for designing media that is in accordance with the learning context and student profile.
2. Product Design Stage: refers to the *Design* stage of ADDIE, *Four-D*, and *Planning* of *Borg and Gall*. At this stage, the researcher prepares a media design in the form of *a storyboard*, narrative scenario, visual design, and supporting devices such as evaluation instruments and instructions for use. The researcher also determines the learning objectives, the stages of PjBL to be visualized, and the flow of video presentation. The format of the media presentation is designed to support the active involvement of students in learning projects.
3. Product Development Stage: media design is realized into an initial product. Refers to the *Development* (ADDIE), *Develop* (Four-D), and *Develop Preliminary Form of Product* (*Borg and Gall*) stages. At this stage, the researcher produces video media through the process of taking images, editing videos, adding narratives, and inserting graphic elements. This initial product was validated by media experts and subject matter experts, then revised based on input to ensure content quality, display, and compliance with PjBL principles.
4. Limited Implementation/Testing Stage: refers to *Implementation* (ADDIE), *Preliminary Field Testing* (*Borg and Gall*), and *the Develop* principle in *Four-D* which includes legibility validation. The revised video media products were tested on a small group of students. The trial process was carried out to determine students' understanding, involvement in learning, and response to the media. Observations and questionnaires are used as tools to collect practicality data.
5. Product Evaluation Stage: integration from *Evaluation* (ADDIE) and product revision from *Borg and Gall* (*Main Product Revision* to *Final Product Revision*). The evaluation was carried out to assess the effectiveness of media in improving learning outcomes, especially through the measurement of student learning outcomes (*pretest* and *posttest*). Evaluation was also carried out from the aspects of understanding, attractiveness, and media contribution to the implementation of the project. Based on the data obtained, a final revision is carried out before the product is declared ready for wider dissemination.

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This data analysis was carried out by two methods, namely quantitative (numerical data) and qualitative (interview data). Quantitative data analysis using a likert scale with SPSS tools. Meanwhile, qualitative data analysis is through interview transcription, data reduction, categorization, and conclusion drawn.

RESULTS AND DISCUSSION

Stages of Analysis

Overall, the results of the questionnaire show that project-based learning video media is very relevant to the characteristics and learning needs of vocational school students. The development of such media can be an effective solution to overcome difficulties in understanding abstract concepts, while increasing students' motivation and participation in practice-based learning. The results of the analysis of the initial needs questionnaire of students attended by 20 respondents showed that students at vocational schools have a very high level of readiness and need for the use of *Project-Based Learning* (PjBL)-based learning video media in the subject of Electrical Engineering Basics. This is shown by an overall average score of 91.95%, which falls into the very high category.

The aspect of student readiness in video-based learning, the percentage reached 90.6%, which shows that students are used to using video as a learning resource and have access to digital devices. The aspects of preferences and learning styles obtained the second highest score of 91.8%, which indicates that the majority of students have a visual learning style, liking concise, illustrative, and direct impressions on the core of the material. The aspect of the level of understanding and difficulty of students was at a score of 90.6%, indicating that students still face obstacles in understanding the basic concept of electricity and urgently need the help of visual media that is able to bridge between theory and practice.

Finally, in the aspect of readiness for the PjBL model, the highest score was obtained at 94.8%, which indicates that students welcome the project-based approach, especially if it is supported by learning media that can guide them to complete the project gradually and independently. Based on the results of the material analysis, references were obtained in developing PjBL-based learning videos that can be easily accessed from various locations. Analysis of the characteristics of students' learning styles indicates that students are more likely to understand the material through active engagement, hands-on experience, and engaging learning visualizations. All of these results support the development of PjBL-based learning video media because it is in accordance with the characteristics of vocational school students who require a visual approach, hands-on practice, and support for independent learning tools (Sawenduling et al., 2022).

Design Stage

Content design is the initial stage in the design of learning video media, which aims to determine teaching materials that are relevant to the learning objectives and principles of PjBL. In this case, the material chosen is the Basic Theory of Electricity and Materials Used in Electrical Engineering, because it is fundamental and easy to apply in simple projects. The content is compiled following the stages of PjBL, namely problem identification, project

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planning, implementation, as well as evaluation and reflection. The material is not only described narratively, but it is also associated with practical activities such as assembling a simple electrical circuit and testing conductor materials and insulators. Videos not only convey information, but also stimulate students' critical thinking and problem-solving skills in a contextual manner.

The second stage is project design which is an important stage in designing PjBL-based learning video media. The project is designed to be both applicative and contextual, such as creating a simple electrical circuit using conductor and insulator materials that are easy to find in the surrounding environment. The learning video serves as a visual guide that explains the steps of planning, implementing, and evaluating the project. Students not only understand the basic concepts of electrical theory, but also integrate them into active and meaningful learning experiences.

The third stage is Prototyping is an initial design or rough model of a learning video designed to test ideas, material structure, and learning flow in general. Prototypes usually contain a video content framework, a summary of segments based on the stages of PjBL, and an overview of the project that will be carried out by the students. The main goal of prototyping is to obtain initial input from teachers, students, or media experts before the media is further developed. Prototypes are flexible and can still undergo many changes.

The production preparation stage begins with production preparation activities, namely perfecting the narrative script (*voice-over*) based on the flow in the *storyboard*. At this stage, mapping of the shooting location such as classrooms, electrical laboratories, or the environment around the school is carried out. In addition, all the necessary equipment is also prepared such as a high-resolution camera or mobile phone, tripod, microphone, additional lights (if necessary), as well as electrical tools and materials such as cables, connectors, and hand tools. No less important, prepare a systematic shooting schedule so that the documentation process runs efficiently.

Figure 1. Taking videos of students practicing and teachers explaining
Source: Research Documentation, 2025

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After all the preparations are complete, the next stage is the shooting (in **Figure 1**). At this stage, all scenes that have been designed in the storyboard are recorded, either in the form of the main scene, as the teacher explains, students discuss, design, practice projects, and take additional *footage* or *B-roll* such as *close-ups of* power tools, illustrative images of cables, to the atmosphere of the workshop or classroom. In between this process, a narrative (*voice-over*) was also taken for the video concept using a voice-over narrator. The demonstrative video directly uses narration from the teacher or students directly on location.

Development Stage

Analysis of the Level of Validity of PjBL-based Learning Video Media was carried out to assess the extent to which the developed media meets the criteria for content suitability, construction, and usability in the learning context. This validity is usually obtained through an assessment process by experts (*expert judgment*) including material content experts, and learning media experts. The following is a narrative description of validity analysis based on relevant aspects.

1. Validation of Material Content: Based on the assessment given, there are 12 indicators that are rated "Very Valid" (score 5) and 2 indicators that are rated "Valid" (score 4). Thus, the total score obtained is 68 out of a maximum score of 70, or equivalent to a validity percentage of 97.14% "Very Valid". The validator provides suggestions for improvements in the editorial aspect of learning objectives, so that they are prepared using the ABCD (*Audience, Behavior, Condition, Degree) rules*. This advice is technical in nature and does not affect the substance of the material. It can be concluded that the learning video media developed has a very high level of validity and is suitable for use in the learning process with a slight minor revision in certain editors. This shows that the content of the material has met pedagogical and substantive criteria relevant to the learning needs of vocational schools.
2. Learning Media Validation: Based on the assessment of the validated learning media developed, the validity level obtained a validity level of 83.81% so that it was declared very valid and suitable for use with minor revisions, especially in the explicit aspect of the PjBL stage in the narrative and video display.

Implementation Stage

PjBL-based learning video media was tested directly in class X TITL (Electrical Power Installation Engineering) SMK Negeri 6 Takalar with a total of 20 students. This implementation aims to find out the quality and practicality of media in real learning situations. The video was used as an opening to learning activities that contained the stages of PjBL, followed by the implementation of project tasks by students in groups. The teacher acts as a facilitator in this process.

The results of the calculation from the questionnaire filled out by the subject teachers showed that the learning video media obtained a score of 94 out of a maximum score of 100, with a practicality percentage of 94%. It can be concluded that the PjBL-based learning video media

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developed is included in the category of "Very Practical". Teachers feel that this media can be easily integrated into learning without significant obstacles, so that it can be an effective teaching tool, especially in practice-based learning in vocational schools.

The results of a small group trial involving 6 students of class X TITL SMK Negeri 6 Takalar, obtained a total empirical score of 552 out of a maximum score of 600 so that the level of practicality of PjBL-based learning video media reached 92%. This percentage shows that the media is classified as "Very Practical". Students consider that the media is easy to use, interesting, helps with concept understanding, and guides the project stages clearly. It can be concluded that this media is stated to be very feasible for use in project-based learning in the subject of Fundamentals of Electrical Engineering.

Evaluation Stage

Table 1. *Pretest* and *Posttest* with Score Gain

Respondents	Pretest	Posttest	Score Gain
S1	33	48	0,555556
S2	33	51	0,666667
S3	33	55	0,814815
S4	45	57	0,8
S5	39	54	0,714286
S6	30	51	0,7
S7	36	51	0,625
S8	45	55	0,666667
S9	36	54	0,75
S10	36	51	0,625
S11	33	56	0,851852
S12	36	54	0,75
S13	33	51	0,666667
S14	33	52	0,703704
S15	45	57	0,8
S16	30	51	0,7
S17	36	57	0,875
S18	36	54	0,75
S19	45	57	0,8
S20	45	57	0,8
Average	36,9	53,65	0,730761

Source: Research, 2025

Media effectiveness:

$$Gain\ skor\ = \frac{53{,}65 - 36{,}9}{60 - 36{,}9} = 0{,}73$$

Based on the results of *the pretest* and *posttest* tests on 20 students (in **Table 1**), an average gain score of 0.7307 was obtained, which is included in the high category according to the Hake classification. This shows that the PjBL-based learning video media developed is very

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effective in improving students' creative ability to the Basics of Electrical Engineering material. The significant increase in *posttest* scores reflects that the project-based approach visualized through video is able to help students relate theoretical concepts to practice in a more real and contextual way. Therefore, this media is not only valid and practical, but also proven to be empirically effective in improving students' creative abilities in the subject of Electrical Engineering Fundamentals at SMK Negeri 6 Takalar, especially in class X TITL.

Discussion

The use of Project-Based Learning *(PjBL)-based learning videos in education, especially in the subject of Electrical Engineering Fundamentals, functions as a strategic medium that integrates the delivery of conceptual materials with visual and systematic project implementation guidelines* (Yuanta, 2020). These videos not only present theories, but also provide field practice simulations, guide learners through the project stages from problem formulation to final reflection, as well as allow for flexible and independent learning access. Video media encourages the development of 21st century skills such as critical thinking, collaboration, and digital literacy (Susanti et al., 2025). The PjBL-based video media developed is not only proven to be valid and practical, but also empirically effective in improving students' creative abilities according to 21st century vocational learning standards, especially in the realm of practical skills and problem solving so that it has an impact on improving learning outcomes. In line with the results of previous research that showed that learning video media can improve student learning outcomes (Sya'ro & Dewi, 2022). The media that has been developed requires no additional training, can be used with standard devices in schools and is very helpful in directing the project-based learning process.

PjBL-based learning videos have a number of key characteristics designed to support the project-based learning process holistically. First, these videos are problem-based in that the show begins with the presentation of real problems or contextual challenges that encourage students to think critically and creatively (Fajriah et al., 2021; Susanti et al., 2025). Second, the video has a flow based on project stages including problem identification, planning, implementation, and evaluation of results so that students get visual guidance in each *phase* of the work (Nurhadijah et al., 2024). Third, the videos present real-world context, often featuring field simulations, technical practices, or case studies relevant to life and industry (Dewi et al., 2024). Fourth, the video is interactive and reflective, with a question starter or project assignment that must be answered or completed by students. Fifth, videos support collaboration and the final product, encourage students to work in teams and produce real work as a form of learning achievement (Athaya et al., 2024). These characteristics make PjBL videos not only an instructional medium, but also a facilitator of an in-depth thinking and working process as previous research has stated that the use of animated videos improves the quality of learning (Haq & Irawati, 2022).

Although, the PjBL-based learning video media that has been developed shows an excellent level of validity, practicality, and effectiveness, there are still some shortcomings that need to be observed for further development. One of the main obstacles is the media's dependence on technological devices and supporting infrastructure, such as the availability of laptops, projectors, *speakers*, and a stable power grid. This is a challenge in itself if applied in schools

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that have limited facilities. In addition, although the media has shown the stages of PjBL explicitly and the duration has been adjusted to be more concise (about eight minutes), the nature of the video that is still one-way has become a limitation. This media does not allow students to interact directly, for example through quizzes, automated feedback, or flow adjustments based on student choices. On the other hand, although this medium is very suitable to be used to strengthen the learning of the basics of electrical engineering, the content is still limited to basic competencies. In addition, even though the media is quite flexible, teachers still need to provide assistance so that the material can be optimally absorbed by students with diverse learning speeds.

CONCLUSION

The development of *Project-Based Learning* (PjBL)-based video media bridges the concepts of electrical practice theory and skills, according to the needs of teachers and students. The videos come with narration, visual illustrations, and text markers to clarify the learning flow. The design is made in accordance with the characteristics of vocational school students who are simple, communicative, interesting, and relevant to the context of real life and the world of work. The content of the material is in accordance with the curriculum, the presentation is systematic, and the media is considered to support the achievement of learning objectives. Overall, the media was declared to be very valid and suitable for use. The practicality test is carried out through direct implementation in the classroom, and is assessed by teachers and students. The results show that the media is easy to use, engaging, and fits the needs of project-based learning. Teachers have no difficulty in integrating media into learning, and students find it helpful in understanding the material and carrying out projects. The effectiveness of the media was measured through *pretest* and *posttest* using the rubric of practical assessment. The results showed a significant increase in the ability of students to understand concepts and create electrical projects, with *a gain score* in the high category. This shows that the media is not only attractive in appearance, but also able to improve learning outcomes in real terms, especially in the aspects of practical skills and creative thinking. Further research can develop learning media that includes quizzes so as to support feedback in learning.

AUTHOR'S NOTE

The author declares that there is no conflict of interest related to the publication of this article. The author emphasizes that the data and content of the article are free from plagiarism.

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