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Engaging electrical lighting installation classes: Android interactive learning media development with Adobe Animate CC

Nuraminah[1], Fauzan Azim[1,*], Khairul Anshari[1] and Ulzhan Urazaliyeva[2]

[1] Study Program of Vocational Education of Electronics Engineering, Faculty of Teacher Training and Education, Universitas Muhammadiyah Riau, **Indonesia**
[2] SDU University, **Kazakhstan**

*Corresponding Author: fauzanazim@umri.ac.id
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Abstract: This study aims to develop android-based interactive learning media for Electrical Lighting Installation subjects by using Adobe Animate CC. The research was conducted in response to the limited variation of learning media, which has affected student engagement and motivation in technical subjects. The Research and Development (R&D) model, adapting a 3D out of 4D model (Define, Design, Develop) was referred to develop interactive media designed for vocational students. The media integrates audiovisual elements to enhance students' learning experiences and promote independent learning outside the classroom. The validation process utilized questionnaires, interviews, and observations from content experts, media experts, and students. The media was validated by experts in two stages. In the first stage, the media achieved a feasibility score of 68%, categorized as "fairly good." After revisions, the second validation showed an improvement with a feasibility score of 85.33%, categorized as "very good". The results indicate that the Android-based learning media potentially enhance the learning process of Electrical Lighting Installation subjects effectively, providing a more engaging and flexible tool for students. This innovation significantly contributes to improving the quality of technical education by offering an accessible and interactive learning resource. It also addresses the challenges of limited learning media variation and encourages independent learning, possibly serving as a model for the development of similar media in other technical subjects.

Keywords: Interactive learning media; Adobe animate CC; Electrical lighting installation; Media validation

1. Introduction

The rapid advancement of science and technology has significantly impacted various aspects of life, including education (Abdulrahaman et al., 2020; Sharma et al., 2023). In today's digital era, countries around the world are striving to improve the quality of education by integrating information and communication technologies (ICT) into learning processes (Criollo-C et al., 2024; Fortuna et al., 2023; Fortuna, Prasetya, García, et al., 2024). The use of technology in education fosters more innovative and interactive learning environments, enabling students to develop their potential independently. Across formal, informal, and non-formal education, technology serves as a catalyst for enhancing learning quality and facilitating effective teaching processes (Bunyamin et al., 2022; George, 2023; Opesemowo & Adekomaya, 2024).

The importance of integrating technology into education is further emphasized by (Prasetya et al., 2024), who found that educational media can stimulate students' interest, increase motivation, and have a positive psychological effect on learning outcomes. However, challenges remain, particularly in technical subjects such as Electrical Lighting Installation. Observations in the Electrical Power

Installation Department reveal that the theoretical learning media currently used are limited in variety and fail to effectively engage students, leading to decreased motivation and difficulty in independent learning outside the classroom (Owens et al., 2017; Rahiem, 2021).

In order to address these challenges, there is a need for innovative learning media that can actively motivate and engage students in the learning process. This study aims to develop Android-based interactive learning media using Adobe Animate CC specifically for the Electrical Lighting Installation subject. Adobe Animate CC was selected for its ability to produce visually engaging animations and interactive media, which can be accessed through multiple platforms, including smartphones (Aini & Mufit, 2022; Wahyuliana & Andrian, 2022). Previous studies have demonstrated the potential of interactive media in vocational education. (Hutagalung, 2022), found that the use of Adobe Flash-based interactive media exceeded minimum school criteria, while (Anggraini & Mufit, 2022) highlighted the importance of integrating multimedia elements like Adobe Animate CC to make complex technical concepts more engaging. Despite these advancements, challenges remain in terms of low conceptual understanding and persistent misconceptions, especially when using technologies such as Adobe Animate CC in technical subjects like Electrical Lighting Installation. These limitations result in lower student motivation and hinder independent learning (Rahiem, 2021; Sari et al., 2021).

Therefore, developing more innovative and diverse learning tools that incorporate advanced technologies is crucial. By addressing common misconceptions and actively engaging students, these tools can foster deeper conceptual understanding and promote self-directed learning. In the case of Electrical Lighting Installation, leveraging Adobe Animate CC for creating interactive multimedia learning tools can help overcome current limitations, enhancing both student engagement and autonomy. Moreover, these tools should cater to diverse learning styles and provide hands-on, practical experiences essential for technical education. This approach aligns with the increasing demand for 21st-century skills, where integrating technology into education is vital for developing critical thinking, problem-solving, and technical expertise among students (Care et al., 2018; González-Pérez & Ramírez-Montoya, 2022).

The novelty of this study lies in its use of Adobe Animate CC to create Android-based interactive learning media with integrated audiovisual concepts, which, while innovative, builds on prior research that has explored the use of Android-based media in education. Previous studies have examined various applications of Android-based learning media, demonstrating improvements in student engagement and motivation (Muskhir et al., 2023; Wulansari et al., 2024). However, many of these studies have noted limitations, such as a lack of variety in interactive features, insufficient focus on technical subjects, and limited opportunities for independent learning. Additionally, the absence of multimedia integration in many Android-based tools has hindered their effectiveness in conveying complex technical concepts, particularly in vocational education settings.

Building on these shortcomings, this research seeks to address the gaps by introducing a more robust, feature-rich Android-based learning media for Electrical Lighting Installation. Key improvements include enhanced interactivity, the integration of dynamic audiovisual elements, and the ability to support various learning styles. By incorporating these features, this study aims to overcome the motivational and conceptual challenges identified in prior research, offering students a more engaging and independent learning experience. Furthermore, this innovation allows for flexible access through smartphones, providing students with the tools needed to explore practical subjects both inside and outside the classroom. Ultimately, this study contributes significantly to improving the quality of technical education at vocational schools by offering a more comprehensive and interactive approach to learning. It not only enhances the theoretical learning process but also encourages digital literacy

and independent study, serving as a reference for future developments in educational media, particularly within the context of technical and vocational education in Indonesia.

2. Methods

2.1 Research design

This study employs the Research and Development (R&D) method to develop and test the effectiveness of an Android-based interactive learning media for Electrical Lighting Installation using Adobe Animate CC with an APK extension (Prasetya, Fajri, et al., 2023; Waskito et al., 2024). The development process adapted 3D out of 4D model (Define, Design, Develop) as outlined by (Thiagarajan et al., 1974). However, due to time and resource constraints, this study focuses on the first three stages: Define, Design, and Develop. It is important to note that the researcher limits the study to these three stages, with the understanding that not all stages of the 4D model need to be fully implemented in every research. This adjustment is common in development research, particularly when time and resource limitations are a concern (Fortuna, Prasetya, Samala, et al., 2024; Prasetya, Fajri, et al., 2023). For instance, according to (Thiagarajan et al., 1974), the stages of the 4D model can be adapted to the specific needs and objectives of the research, and not all stages need to be implemented in the same context. This is also supported by (Fortuna, Prasetya, Samala, et al., 2024), who found that in some cases, the Disseminate stage can be skipped or postponed until subsequent studies are conducted.

The Define stage involves an initial analysis of learning needs through observations and limited trials to gather data on the subject matter. In the Design stage, the learning media is created by compiling relevant content, selecting the appropriate media format, and developing the initial design of the Android-based application. Finally, the Develop stage includes validation by media and content experts, followed by revisions and product testing through student questionnaires to assess its usability and effectiveness.

Table 1. Media research stages

Stage	Development process	Description
Define	Definition	Conduct initial analysis through observation to identify learning needs related to Electrical Lighting Installation.
Design	Design	Designing Android-based learning media by compiling materials, selecting formats, and designing application designs.
Develop	Development	Develop media according to design, validate through experts, revise products, and test them on students.

2.2 Subjects and place of research

This research was conducted in August 2023 at SMK Negeri 1 Koto Gasib. The location was chosen for its accessibility to the researcher. The test subjects included one content expert, a teacher of the subject, one media expert, and 20 students from SMK Negeri 1 Koto Gasib.

2.3 Data collection technique

This study utilized multiple methods to gather relevant data for the development of Android-based learning media (Alahakoon & Kulatunga, 2021). The primary techniques for data collection included

questionnaires, structured interviews, and classroom observations (Nurhikmah et al., 2024). The questionnaire served as the main instrument to measure the perceptions of content experts, media experts, and students. A 5-point Likert scale, ranging from "strongly agree" to "strongly disagree," was used to evaluate respondents' feedback regarding the feasibility of the learning media in terms of content, design, and technical aspects. The indicators assessed in the questionnaire covered both content aspects (content and objective quality, technical quality, instructional quality) and media aspects (display media, programming, letterforms, language). Student responses were evaluated based on material quality, technical quality, and learning quality. The questionnaires were reviewed by doctoral and professor-level experts with 30 to 40 years of teaching and research experience (Syahril et al., 2021).

The content expert questionnaire focused on evaluating the relevance and depth of the content presented in the media, while the media expert questionnaire assessed the quality of interface design and usability (Prasetya, Syahri, et al., 2023). Additionally, the student questionnaire aimed to measure student engagement, understanding of the material, and satisfaction with the Android-based media. Structured interviews with content and media experts provided more detailed feedback on the evaluation and improvement of the media, complementing the results obtained from the questionnaires (Sobaih et al., 2020). Furthermore, classroom observations were conducted during trials to assess how students interacted with the media throughout the learning process, including recording their responses and identifying any challenges they encountered.

2.4 Assessment instrument

According to (González-Díaz & Bustamante-Cabrera, 2021), research instruments are tools used to measure observed natural or social phenomena. All observed phenomena are considered research variables (Morris et al., 2020). In this study, the instruments used to collect data during the development of the Android-based Electrical Lighting Installation learning media using Adobe Animate CC were questionnaires. These questionnaires were designed to evaluate various aspects of the research, including a questionnaire for content experts, media experts, and students. The grids of data collection instruments are shown in Tables 2, 3, and 4.

Table 2. Checklist for material expert validation

Aspect	Indicator
Content and Objective Quality	Suitability of material
	Clarity of the material presented
	Depth of material presented
	Ease of understanding the material
	Accuracy of language use
	Suitability of quizzes with material
	Provision of practice questions for concept understanding
	Quality of evaluation questions and their assessment
	Provision of feedback on exercise questions and evaluation
Technical Quality	Selection of background color
	Harmony of background color with text
	Layout
	Placement of buttons in the media
	Media icon display
	Animation display
	Image display

	Simulation circuit display
	Ease of navigation
	Accuracy of button usage
	Ease of choosing a menu
	Selection of font type and size
	Readability of text
	Communicative use of language
Instructional Quality	The possibility of increasing student learning motivation
	Possibility of providing student learning assistance

Table 3. Checklist for media expert validation

Aspect	Indicator
Display Media	Selection of background color
	Harmony of background color with text
	Layout
	Placement of buttons in the media
	Media icon display
	Animation display
	Image display
	Simulation circuit display
	Clarity of narration
Programming	Ease of navigation
	Conformity of button usage
	Ease of choosing a menu
Letterforms	Selection of font type and size
	Readability of text
Language	Use of communicative language

Table 4. Checklist for student responses

Aspect	Indicator
Material quality	The learning objectives to be achieved are clear
	The description of the material presented is clear and not confusing
	Easy to understand the material
Technical quality	The intro (opening part) in this learning media is interesting
	The learning media has an attractive appearance
	The narration and background make me concentrate.
	The words/sentences used are easy to understand
	The animations and simulations are simple and provide additional explanations so that I help me understand the material.
	The existence of quiz and assessment score can measure
Quality of learning	By using this learning media, I am more interested in learning Electrical Lighting Installation.
	By using this learning media, it makes me excited to learn.
	This Android-based learning media helps me make it easier to understand the Electrical Lighting Installation material.

2.5 Data analysis techniques

This study focuses on developing Android-based learning media for Electrical Lighting Installation using Adobe Animate CC for students in the XI TITL class at SMK Negeri 1 Koto Gasib. Data from validated questionnaires by media experts, content experts, and teachers were analysed to get the feasibility percentage which was calculated by using the following Eq. 1.

$$\text{Feasibility Percentage \%} = (\text{Total Score} / \text{Maximum Score}) \times 100\% \quad (1)$$

Table 5. Evaluation scale categories

Description	Score Range	Category	Value Range
Very good	4,21-5,00	Very Feasible	81% - 100%
Good	3,41-4,20	Feasible	61% - 80%
Good enough	2,61-3,40	Less Feasible	41% - 60%
Not good	1,81-2,60	Not Feasible	21% - 40%
Very poor	1,00-1,80	Very Not Feasible	0% - 20%

After the respondents, including media experts, content experts, and students, completed the questionnaires, the next step was calculating the feasibility percentage based on Table 5. This process provided a clear picture of whether the developed learning media met the expected standards or required further revisions.

3. Results

This study aimed to develop an Android-based interactive learning media for Electrical Lighting Installation using Adobe Animate CC. The development model utilized was a modified 3D out of 4D model, encompassing the stages of Define, Design, and Develop. In the Define stage, an initial analysis was conducted to identify challenges in the learning process at SMK Negeri 1 Koto Gasib. Observations revealed significant limitations in the available learning media, which primarily relied on textbooks and modules. This reliance led to low student engagement. Additionally, an analysis of the Electrical Lighting Installation syllabus was performed to determine which materials would be incorporated into the Android-based media.

Following this, the Student Analysis focused on identifying student characteristics, including academic ability, cognitive development, and motivation related to the learning topic. The current learning environment was predominantly textbook-driven, with no interactive Android-based learning media available. The Concept Formulation step involved systematically organizing key materials, such as Safety Protection, General Requirements for Electrical Installations (PUIL), and Simple Home Building Installations. Observations indicated that students preferred summarized materials presented with engaging visuals.

In the Design stage, flowcharts and storyboards were created to illustrate the logic and visual flow of the developed learning media. This stage included designing the learning media using Adobe Animate CC and creating a storyboard to visualize the media's concept. The storyboard served as a guide for illustrating each phase of the Android-based interactive learning media application. The design outcomes for the interactive Android learning media for the Electrical Lighting Installation subject are presented in Figure 1.

Figure 1. Android interactive learning media using adobe animate CC

(a) Intro Display

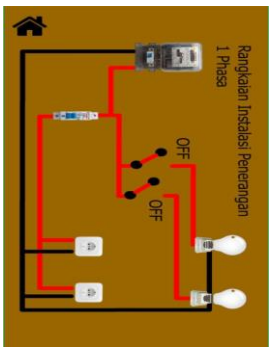
(b) Initial Menu Display

(c) Material Menu Display

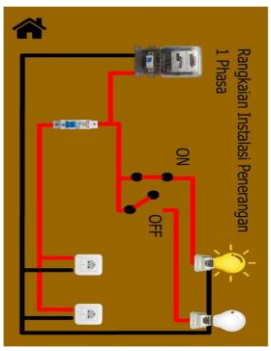
(d) Display Material Content

(e) Quiz View

(f) Quiz Score Result Display



(g) Circuit display when off



(h) Circuit display when on

(i) Profile view

The application design was developed based on the storyboard outlined in Figure 1, encompassing various features integral to the Electrical Lighting Installation learning media. The front page of the application displays the title, user's name, class, and navigation buttons leading to the main menu. The main menu consists of components such as profile, materials, quizzes, and circuit simulation buttons. Upon entering the application, users can input their names and class before pressing the "start" button to access the main page. This page includes a scroll pane featuring motivational quotes and navigation buttons directing users to the profile, materials, quizzes, and electrical circuit simulations. The materials menu presents several learning topics, including Safety Protection, General Requirements for Electrical Installations (PUIL), Lighting and Measurement Laws, and Simple Home Building Installations. Each topic is supplemented with text, images, and navigation buttons, such as "home" to return to the main page and "back" to revisit previous materials.

The quiz section consists of ten multiple-choice questions presented sequentially, with scores calculated based on correct answers, ranging from 0 to 100. Users can view their scores upon completing the quiz. Furthermore, the application features a simple simulation of a single-phase electrical lighting installation, enabling users to observe changes in electrical flow when the switch is activated. The profile display provides information about the application developer, including their name, student ID, study program, motto, and supervisor. The design and development of this media were validated by a media expert from the Informatics Education Department of Muhammadiyah University of Riau. Validation involved a 15-item questionnaire assessing the feasibility of the Android-based learning media created using Adobe Animate CC before its implementation in schools.

In order to enhance the effectiveness of this application compared to existing educational apps on the Play Store, it possesses several advantages in terms of interactivity and an engaging learning experience. The inclusion of a circuit simulation feature allows users to grasp complex concepts visually and practically, thereby increasing student engagement and information retention. Additionally, the application incorporates motivational elements, such as inspirational quotes, which can help stimulate students' enthusiasm for learning. Although currently limited to Android and not yet available on the App Store, further development is planned to expand the accessibility of this interactive learning media to other platforms. This aims to ensure that a broader range of students can access this engaging educational tool, facilitating a more flexible and comprehensive learning process. Future plans include further testing in various educational environments and the adjustment of features based on user feedback to ensure that the application meets the learning needs of students effectively. The results of the first stage media expert assessment are presented in Table 6.

Table 6. First stage media expert validation results

Indicators assessment	Assessment aspect	Score
Display media	Selection of background color	4
	Harmony of background color with text	4
	Layout	3
	Placement of buttons in the media	4
	Media icon display	4
	Animation display	2
	Image display	4
	Simulation circuit display	2
	Clarity of narration	2
Overall		**29**
Programming	Ease of navigation	4
	Conformity of button usage	5
	Ease of choosing a menu	5
Overall		**14**
Letterforms	Selection of font type and size	3
	Readability of text	2
Overall		**6**
Language	Use of communicative language	2
Overall average		**51**

$$P = \frac{\sum x}{N \times \sum x_1} \times 100\% = \frac{29 + 14 + 6 + 2}{15 \times 5} = \frac{51}{75} \times 100\% = 68\%$$

Based on the first validation by media experts (Table 6) on the Electrical Lighting Installation learning media, the average score for all aspects was 3.20, which falls into the "fairly good" category with a feasibility percentage of 68.00%. However, this media was deemed not yet suitable for use as instructional media. Consequently, revisions were made by the media experts in the second stage to enhance the media's feasibility. The assessment results from the second stage of media expert validation are presented in Table 7.

Table 7. Second stage media expert validation results

Indicators assessment	Assessment aspect	Score
Display Media	Selection of background color	5
	Harmony of background color with text	5
	Layout	4
	Placement of buttons in the media	4
	Media icon display	4
	Animation display	4
	Image display	4
	Simulation circuit display	4
Overall		**34**
Programming	Ease of navigation	5
	Conformity of button usage	5
	Ease of choosing a menu	5
Overall		**15**
Letterforms	Selection of font type and size	5
	Readability of text	5
Overall		**10**
Language	Use of communicative language	5
Overall average		**64**

$$P = \frac{\sum x}{N \times \sum x_1} \times 100\% = \frac{34 + 15 + 10 + 5}{15 \times 5} = \frac{64}{75} \times 100\% = 85.33\%$$

In the initial media validation, the learning media received an average score of 3.20, falling into the "fairly good" category with a quality percentage of 68.00%. After revisions, the second stage of validation showed significant improvement, with the average score reaching 4.26, classified as "very good," and a quality percentage of 85.33%. This indicates a substantial improvement in the quality of the Android-based learning media developed using Adobe Animate CC. This improvement is evident from the increase in the average score. Additionally, based on the validation results, experts provided several suggestions for improvement, which were then implemented according to the material expert's recommendations.

$$P = \frac{\sum x}{N \times \sum x_1} \times 100\% = \frac{42 + 64 + 9}{25 \times 5} = \frac{115}{125} \times 100\% = 92\%$$

Table 8 illustrates the material expert validation results for the Electrical Lighting Installation learning media. The media received an average score of 4.50, categorized as "very good," with a feasibility percentage of 92.00%. This demonstrates that the media is suitable for use, though some improvements, particularly in adding animations to the visuals, are recommended to further enhance the material's comprehensiveness. The experts suggested incorporating animations or images into the content to aid student understanding.

Table 8. Material expert validation results

Indicators assessment	Assessment aspect	Score
Content quality	Suitability of material	5
	Clarity of the material presented	5
	Depth of material presented	5
	Ease of understanding the material	4
	Accuracy of language use	4
	Suitability of quiz with material	5
	Provision of practice questions for concept understanding	5
	Quality of evaluation questions and their assessment	4
	Provision of feedback on exercise questions and evaluation	5
Overall		**42**
Technical quality	Background color selection	4
	Harmony of background color with text	4
	Layout	4
	Placement of buttons in the media	5
	Media icon display	5
	Animation display	5
	Image display	4
	Simulation circuit display	5
	Ease of navigation	5
	Accuracy of button usage	5
	Ease of choosing a menu	4
	Selection of font type and size	4
	Readability of text	5
	Communicative use of language	5
Overall		**64**
Instructional	Possibility to increase students' learning motivation	4
	Possibility of providing student learning assistance	5
Overall		**9**
Overall average		**115**

A trial was conducted to evaluate the application of the Android-based learning media developed using Adobe Animate CC in the classroom. The assessment questionnaire consisted of 12 items covering material, technical, and instructional aspects, with scores ranging from 1 to 5. The trial was held on August 9, 2023, in class XI of TITL at SMK Negeri 1 Koto Gasib, with 20 students participating. The students' responses to the interactive learning media are summarized in Table 9.

Table 9. Student response assessment results

Indicators assessment	Assessment aspect	Score	Average	Criteria
Materials	The learning objectives to be achieved are clear	90	4.5	Very good
	The description of the material presented is clear and not confusing	91	4.55	Very good
	Easy to understand the material	91	4.55	Very good
Overall		**272**	**4.53**	**Very good**
Technical	Intro (opening part)	89	4.45	Very good
	This learning media has an attractive appearance	89	4.45	Very good
	The narration and background make me concentrate.	92	4.6	Very good
	The words/sentences used are easy for me to understand	89	4.45	Very good
	The animations and simulations are simple and provide additional explanations that help me understand the material.	90	4.5	Very good
	The existence of quizzes and assessment scores can measure my ability and understanding.	90	4.5	Very good
Overall		**539**	**4.49**	**Very good**
Learning	By using this learning media, I am more interested in learning Electrical Lighting Installation	88	4.4	Very good
	By using this learning media, it makes me want to keep learning.	91	4.55	Very good
	This Android-based learning media	92	4.6	Very good

	helps me make it easier to understand Electrical Lighting Installation material			
Overall		**271**	**4.51**	**Very good**
Overall average		**1082**		

$$P = \frac{\sum x}{N \times \sum x_1} \times 100\% = \frac{272 + 539 + 271}{20 \times 12 \times 5} = \frac{1082}{1200} \times 100\% = 90.16\%$$

Based on Table 9, the average feasibility score for the various aspects of the learning media shows very good results. The material aspect received a score of 4.53, the technical aspect 4.49, and the instructional aspect 4.51, all classified as "very good." Overall, the media achieved an average feasibility score of 4.51, with a feasibility percentage of 90.16%. Therefore, the Android-based learning media developed using Adobe Animate CC, specifically for Electrical Lighting Installation, is considered highly suitable for supporting the teaching and learning process for class XI students at SMK Negeri 1 Koto Gasib.

4. Discussion and implications

This research investigates the significance of integrating technology into the learning process, particularly within the context of technical education at vocational high schools (SMK). The findings demonstrate that Android-based learning media, developed using Adobe Animate CC, has significant potential to enhance students' motivation and engagement in Electrical Installation subjects. The use of technology facilitates a more interactive delivery of content, enabling students to overcome the limitations associated with conventional, often monotonous, teaching methods. These results align with prior studies that highlight the positive effects of technology on increasing students' interest and motivation in learning (Chen, 2020; Pan, 2020).

Existing studies on technology in education highlight its ability to improve interaction and learning quality. For instance, (Miguel-revilla et al., 2021) emphasized the importance of instructional media in fostering student interest and motivation, while (Yurtseven Avci et al., 2020) demonstrated how technology integration can create innovative learning environments. This research contributes to the existing literature by presenting an interactive, Android-based learning media approach using Adobe Animate CC, which has not been widely implemented in technical subjects like Electrical Installation. The use of audiovisual technology in creating Android-based learning media represents an innovative solution to the limitations of conventional instructional materials often perceived as less engaging in vocational schools.

Moreover, trials involving students and media experts indicated that the developed learning media is highly feasible regarding both content and design. Students reported heightened interest and motivation due to the animated and interactive presentation of materials through the Android application. This impact was reflected in students' improved ability to learn independently outside the classroom, emphasizing the need for innovation in content delivery, particularly in technical fields that students frequently find challenging. Nevertheless, challenges encountered during the development of this learning media must be acknowledged. A significant obstacle was the limitation in time and resources, which restricted the study to only three stages of the 4D development model. This limitation highlights that while technology-based learning media offers substantial potential, its development necessitates careful planning and adequate resource allocation. Additionally, technical challenges such

as device compatibility and accessibility across various smartphone models must be addressed to ensure effective implementation across classrooms.

This study opens new avenues for future research, particularly regarding the use of Android-based learning media in other technical subjects. The interactive application of audiovisual technology remains underutilized in technical education, making this research a valuable reference for future developers of instructional media. Furthermore, the study underscores the importance of enhancing digital literacy among both teachers and students to support effective technology integration in education. The study offers several important implications. First, the development of interactive Android-based learning media can significantly enhance student motivation in technical education, as evidenced by positive responses from subject matter experts, media experts, and students during media validation. Second, utilizing Adobe Animate CC to create interactive learning media enriches teaching methodologies in technical subjects, especially for theory-based lessons that traditionally rely on textbooks. With technology-based media, students can better comprehend complex technical concepts through engaging visualizations. Finally, this research contributes to advancing digital literacy among teachers and students, which is crucial in today's digital landscape. Additionally, the media development model applied in this study can be adapted for other technical subjects, fostering opportunities for further innovation in vocational education.

5. Conclusion

This research successfully developed interactive, Android-based learning media using Adobe Animate CC, focusing on the Electrical Installation subject at SMK. The media effectively increased student engagement and motivation by providing more engaging and interactive learning experiences. Validation from subject matter experts, media experts, and students indicated that the media is suitable for use in the learning process. The use of audiovisual technology in this learning media also addresses the limitations of conventional instructional materials and enriches teaching methods in technical fields. Overall, this study demonstrated that integrating technology into technical education at SMK can positively impact the quality of learning. However, it also highlights the need to address implementation challenges, particularly in developing learning media that responds to the needs of both students and teachers in this digital age.

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Declarations

Author contribution

Nuraminah: Conceptualization, Methodology, Software, Validation, Writing – Original Draft, Writing – Review & Editing. Fauzan Azim: Data Curation, Formal Analysis, Investigation, Visualization. Khairul Anshari: Supervision, Project Administration, Resources.

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Conflict of interest

No conflicts of interest in this research.

Ethical clearance

The involvement of teachers and students as subjects in this study was in accordance with the Declaration of Helsinki. This research has obtained permission from the SMK Negeri 1 Koto Gasib with number 024.1/SMKN.1KG/2023/064. The school management, teachers, and students have agreed to the publication of data obtained from research at SMK Negeri 1 Koto Gasib.

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