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Design and Validation of Doodly-Based Physics Teaching Materials to Enhance Teachers' Digital Competencies

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Abstract

In the rapidly advancing digital era, the integration of technology in education has become essential for enhancing the learning experience. One promising tool in this regard is animation software like Doodly, which can significantly elevate the quality of physics teaching. This research seeks to develop teaching materials for physics that leverage Doodly's animation capabilities, aiming not only to bolster teachers' digital skills but also to increase student engagement in the learning process. The methodology employed in this study involves a descriptive approach, with design validation conducted by experts in physics, multimedia learning, and educational technology. Expert validation sheets and revision guides were used as instruments, and the data were analyzed using Aiken's V formula to assess the validity of the materials developed. The findings suggest that the Doodly-based physics teaching materials are of excellent quality, demonstrating high validity scores in terms of presentation feasibility (0.89), content feasibility (0.86), and language use (0.89). The animation-based approach in these materials has proven effective in improving students' comprehension of challenging concepts while enriching their learning experience. However, the research also points out that certain aspects, such as visual design and video duration, could still benefit from further refinement. Ultimately, the study confirms that Doodly-based teaching resources are highly effective in enhancing both teachers' digital competencies and student engagement, contributing significantly to the development of more dynamic, technology-driven physics education.

How to Cite

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INTRODUCTION

The digital transformation in education has revolutionized the way teaching and learning occur. The integration of technology is now a critical component in fostering an engaging and enriching learning experience. This is especially true for subjects like Physics, which require innovative approaches to help students grasp abstract and complex concepts (Abel et al., 2022; Graham et al., 2023; Hafifah & Sulistyo, 2020). The rapid adoption of digital tools and the growing demand for digital competencies make it imperative for educators to adapt their teaching strategies to meet the expectations of the modern, tech-savvy student population (Al-Sindi et al., 2023). Yet, despite the increasing emphasis on digital learning, many teachers—especially in regions like Gowa Regency, Indonesia—still face challenges in fully utilizing available digital tools (Mailizar & Fan, 2020; Tondeur et al., 2017).

Interviews with seven high school Physics teachers in the region revealed a notable gap in their use of digital tools, especially interactive applications like Doodly. None of the teachers were familiar with Doodly, an animation software that enables the creation of explanatory videos, despite its growing popularity for creating dynamic, engaging learning environments. Two of the teachers still relied on traditional printed materials such as textbooks and worksheets, while the others had integrated digital tools like PowerPoint, Flipbooks, and e-modules using Canva. However, none of these materials utilized cartoon animations—an engaging method for making Physics lessons more interactive and enjoyable. The teachers themselves expressed that such animations could capture students' attention and enhance their learning experience.

This lack of familiarity with advanced digital tools like Doodly poses a significant challenge in modernizing teaching practices (Andrei, 2017; Liu et al., 2022). Although digital tools are available, their integration, particularly in the form of animations, has not been sufficiently explored (Xia, 2016). Physics, being a subject involving abstract concepts, stands to gain significantly from the use of animation, which helps visualize these ideas more clearly (Goncharenko, 2018). The reliance on traditional materials like textbooks and worksheets is insufficient for meeting the growing demand for digital competencies in both students and teachers (Raja & Nagasubramani, 2018; Tanjung, 2020).

This gap in the effective use of digital tools restricts the potential to improve learning experiences and teacher performance in line with the digital expectations of today's students (Tan & Feng, 2023). Moreover, many teachers lack access to adequate training or professional development in using such tools, further hindering their ability to implement modern, interactive teaching methods (Liu et al., 2022). Without proper support and resources, teachers struggle to innovate and align their practices with the digital age (Raja & Nagasubramani, 2018).

Research has repeatedly highlighted the advantages of using digital tools, particularly animation software, to enhance learning outcomes in Physics. Studies have shown that integrating animations into educational materials boosts student engagement, retention, and comprehension of difficult concepts (Cetnar et al., 2023; Kotsis, 2023). For instance, animation and simulations have proven to help students grasp abstract scientific concepts more effectively than traditional text-based teaching methods (Said, 2022; Tanjung, 2020). Doodly, as a versatile animation tool, enables educators to create custom animations that simplify complex Physics concepts by making them visually engaging and accessible (Retnawati et al., 2018).

Further, literature stresses the importance of crafting digital learning materials tailored to the needs of the digital generation. This includes integrating multimedia components—such as images, videos, and interactive content—into teaching resources, which in turn supports students' digital literacy (Morales, 2016). The integration of such tools is key to developing the digital competencies required for future success (Pranoto & Suprayogi, 2020; Wiener et al., 2018).

However, despite the advantages cited, many teachers, particularly in Gowa, have not yet adopted digital animation tools like Doodly. Existing digital materials, such as PowerPoint slides or e-modules created with Canva, do not fully exploit animation's potential to make lessons more interactive (Adegoke, 2017). This lack of exposure to innovative applications limits teachers' ability to create engaging, customized content for their students. Therefore, this study seeks to bridge this gap by developing Physics teaching materials that incorporate Doodly animations, creating an interactive and stimulating learning environment (Anggraini et al., 2021).

This research intends to bring innovation to Physics education by developing digital teaching materials using Doodly animations. The novelty of this study lies in its focus on creating engaging, interactive content to support the development of digital competencies among Phys-

ics teachers (Montilla et al., 2023). By creating resources that blend animation and digital tools, this study aims to modernize Physics education at the high school level.

The primary objective is to develop Doodly-based teaching materials for eleventh-grade Physics students, enhancing teachers' digital skills and increasing student engagement and understanding of complex Physics topics. The study thus aims to fill the gap in the use of animation in Physics education, offering teachers a new tool to integrate into their practices while fostering the development of students' digital literacy (Oliveira et al., 2022).

Therefore, this study addresses two core issues: the limited use of animation-based teaching tools in physics instruction and the underdevelopment of teachers' digital skills. By designing and validating teaching materials based on the Doodly application, this research aims to provide a practical solution that aligns with national curriculum goals and supports innovation in secondary education.

The novelty of this study lies in the use of Doodly to produce animated, curriculum-aligned physics materials that can enhance both teaching quality and digital proficiency. Specifically, the objective is to develop validated digital learning resources for eleventh-grade physics that are engaging, accessible, and effective in improving student outcomes while simultaneously fostering teacher competence in using educational technology.

METHOD

Research Approach

The research employs a descriptive approach, focusing primarily on the design validation of Doodly-based physics teaching materials to enhance teachers' digital competencies. This approach was selected to evaluate the feasibility and validity of the developed teaching materials, assessed by experts in the fields of physics, multimedia learning, and educational technology. The goal of this research is to systematically assess the quality of the content and multimedia aspects of the materials to ensure their alignment with pedagogical standards for enhancing teachers' digital competencies in physics instruction.

Doodly Development Method

In addition to the general research approach, the Doodly development method is incorporated to streamline the creation of multimedia-based teaching materials. Doodly is a user-friendly animation tool that allows educators to design engaging, visually appealing whiteboard animations to enhance the learning experience. This method was chosen for its accessibility and effectiveness in conveying complex scientific concepts in an easily understandable format.

The Doodly method supports the development of interactive physics materials that engage students and provide teachers with practical tools for digital instruction. By leveraging Doodly's animation features, the research aims to create materials that are not only pedagogically sound but also technologically rich, fostering teachers' competencies in using digital tools for teaching.

Research Instruments

The study utilizes expert validation sheets and revision guides as primary instruments. The validation sheets are used to assess the content quality and multimedia components of the teaching materials based on specific criteria, such as alignment with learning objectives, material relevance, and interactivity of the design. The revision guides were developed based on the feedback provided by the experts, serving as the basis for refining the teaching material prototypes.

Data Analysis Techniques

The validation results were analyzed using Aiken's V formula, which calculates the validity of the materials based on expert feedback. The evaluation involves four criteria as shown below

Table 1. Assessment criteria provided by experts (validators)

Value	Description
1	Not relevant
2	Slightly relevant
3	Relevant
4	Highly relevant

After being assessed by the experts, the results are processed using the Aiken Validation formula to calculate the validity score, as follows. (Aiken, 1980).

$$v = \frac{\sum s}{n(c-1)}$$

where $s = r - l_0$

Explanation:
r = evaluator's rating
l_0 = lowest evaluator's rating
n = number of respondents
c = highest category

Feasibility Analysis

The feasibility of the teaching material design is assessed using Aiken's V table. Based on the analysis, revisions will be made to address any weaknesses identified during the validation process. This iterative validation ensures that the materials meet the pedagogical standards and enhance their effectiveness for both teaching and learning (Zohri et al., 2022).

RESULT AND DISCUSSION

The design of the teaching materials developed in this study incorporates multimedia technologies, including animations, images, and audio, to enhance the delivery of physics concepts. These materials are intended to facilitate student comprehension of complex topics and engage both students and teachers effectively. Previous studies, such as Bua (2022), have demonstrated the effectiveness of animation media in improving elementary students' early reading skills. Similarly, the interactive nature of Doodly allows students to not only engage with theoretical content but also to interact with physical concepts through simulations, visual aids, and quizzes that reinforce learning.

Research by Rahmaniyah & Anggaryani (2023) further supports the use of animation-based video learning tools to enhance educational outcomes, a finding echoed by Sukarini & Manuaba (2021) in the development of online animated videos for science subjects. This study also examines the integration of animation into physics topics, such as dynamics. Concepts like Force Identification, Newton's Laws, and applications of Newton's Laws are presented in engaging animated formats, allowing students to better understand these abstract topics (A. K. Hidayati et al., 2023). The interactivity of the Doodly application aligns with Annisa Wudda et al. (2024), emphasizing the importance of interactive, technology-based teaching methods tailored to meet the needs of contemporary learners.

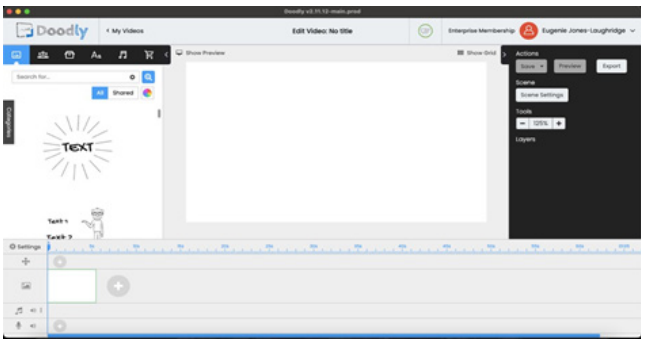
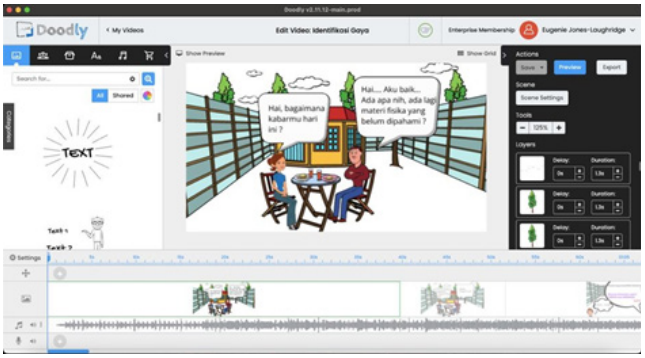
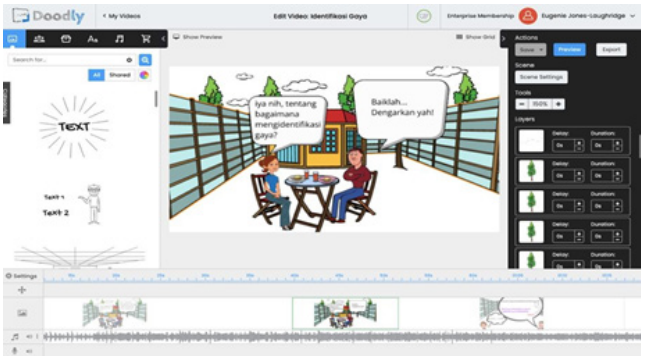
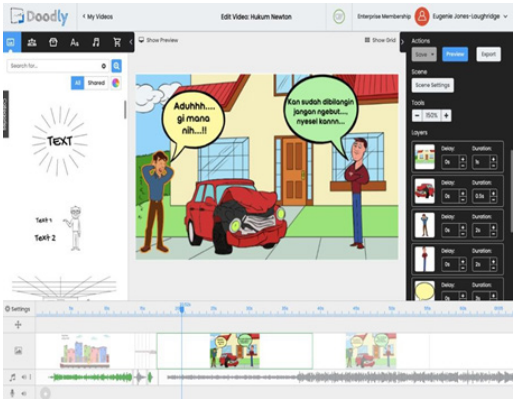
Physics Teaching Material Prototype Based on the Doodly Application

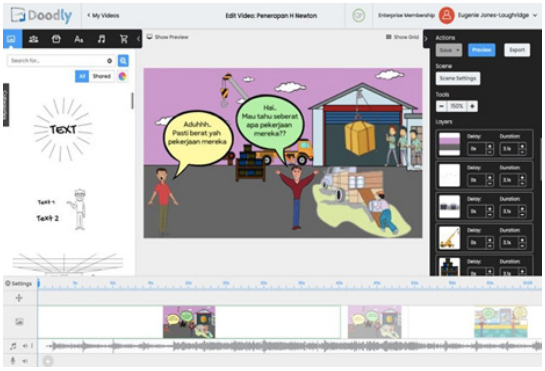
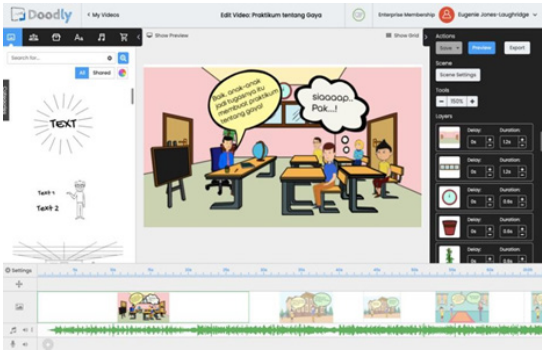
The development of Doodly-based physics teaching materials represents a significant innovation in the learning process, aimed at enhancing teachers' digital competencies. The Doodly application allows the creation of teaching materials in the form of engaging and interactive animated videos, which can effectively enrich students' learning experiences. In this context, the use of technology such as Doodly not only enhances the appeal of teaching materials but also provides teachers with the opportunity to create more visual content that is easier for students to understand, aligning with the needs of modern education (H. H. Hidayati, 2020; Wahyuni & Yolanda, 2021). Additionally, this application makes it easier for teachers to develop more interactive learning materials, allowing students to actively engage in the learning process through animations and in-depth visuals. By using Doodly, teachers can introduce abstract physics concepts in a way that is easier to understand and more engaging for students (Cahyadi, 2019). This is in line with research that shows that the use of multimedia-based teaching materials can enhance the quality of mathematical communication and students' understanding of the material being taught (Wahyuni & Yolanda, 2021).

The Doodly-based physics teaching materials offer significant opportunities to enhance teachers' digital competence. By utilizing Doodly, teachers can easily create engaging and interactive digital content, fostering the development of key digital skills such as video creation, animation design, and content customization. The application's user-friendly interface enables teachers to build visually appealing physics lessons, thereby boosting their ability to integrate multimedia tools into teaching. Additionally, Doodly's capacity to generate real-time feedback through animations and quizzes supports teachers in refining their pedagogical strategies, while also enhancing their proficiency with digital platforms. This exposure to digital tools helps teachers develop a deeper understanding of how technology can be leveraged to improve student engagement and learning outcomes.

The design and validation process of these teaching materials involves systematic steps aimed at ensuring that the produced content is effective in supporting learning. These steps also include testing to ensure that the Doodly-based teaching materials meet the digital competency standards required of teachers, as well as being relevant to the curriculum needs and technological developments in education (Ulum, 2020). As teachers' digital skills grow, these materials will serve as vital tools to improve physics instruction in the digital age. Some sections of the teaching material prototype can be seen in Table 2 below.

Table 2. Images and descriptions of doodly-based physics teaching materials

Picture	Description
 Initial View of the Doodly App	This screenshot showcases the Doodly app's main interface, where users can add text, images, and adjust element durations via the timeline.
 Initial View of Force Identification Material	The image shows the digital classroom interface for a physics lesson on force identification. Two characters are seen sitting at a desk, engaged in conversation. The setting used creates a relaxed atmosphere, and the user interface displays various options to customize the characters and elements. This scene is designed to introduce physics concepts, and the conversation between the characters seems aimed at further explaining the concept of force. The setup is intended to make learning more interactive and easier to understand.
 Force Identification	This image shows the Doodly app interface used to explain the topic of force identification. Two male characters are seen talking at a table with a background of a green fence and a clear sky. One character is explaining the topic, while the other is listening. Their conversation is displayed in speech bubbles. This comic-style animation design makes the material more engaging and easier to understand, while also allowing the creation of educational and entertaining animations.
 Newton's Laws of Motion	This image shows the video creation app interface for teaching Newton's Laws. At the top, there is a title "Newton's Laws" indicating the topic being discussed. The design uses animation to depict everyday events, such as vehicle accidents, with cartoon characters interacting. Text is also used to explain the context of the event. This app combines visuals and explanations, making the teaching material more engaging and helping learners understand the physics concepts explained in Newton's Laws.

Picture	Description
 Application of Newton's Laws	This image displays the interface of a digital animation tool or learning device used to explain Newton's Laws. It features a cartoon-style scene depicting characters performing physical activities that may be related to the principles of Newton. The interface likely includes text boxes, character images, and simple animations aimed at visualizing the laws of motion in a fun and engaging way. This approach makes it easier for learners to understand complex scientific concepts.
	This image depicts the interface of a digital learning platform used to practice the concept of force. In the image, students are conducting an experiment on force in a virtual classroom. Cartoon characters are interacting with each other, with one student raising their hand as if asking the teacher a question. The text displayed reinforces the context of interactive learning, where students are given the task to design experiments related to force.

Validation Results of Digital Physics Teaching Materials with the Help of the Doodly Application

The validity test of the Doodly-based physics teaching materials was conducted through expert evaluation, focusing on three key aspects: presentation feasibility, content quality, and language use. Presentation feasibility assessed the effectiveness and appropriateness of the visual and interactive elements, such as animations and videos, in delivering intended content. Content quality evaluated whether materials were accurate, relevant, and aligned with physics curriculum. Lastly, language use was assessed based on clarity, appropriateness, and the ability to engage students, ensuring that the language was understandable and suitable for the target audience. Each of these aspects was crucial in ensuring overall effectiveness and educational value of materials.

The science material in the Doodly app focuses on essential physics concepts such as force identification, Newton's laws of motion, and the application of these laws in real-world scenarios. The app includes animated content that visualizes abstract concepts, making them more accessible to students. For example, force identification is depicted through interactive scenarios where characters demonstrate various forces in action. Newton's laws are explored through animated videos that illustrate real-life examples, such as vehicle accidents and the movement of objects. These animations not only reinforce theoretical knowledge but also provide students with practical understanding by connecting physics principles to everyday life. The Doodly app thus combines theoretical physics with engaging visual simulations, making the material more relatable and easier to grasp.

The development of digital physics teaching materials using applications like Doodly is gaining recognition as it is considered to enhance the quality of learning. This application not only provides visual elements such as videos or illustrations of real-life cases, but also directly connects physics concepts with real-life situations that are relevant to students' lives. This approach is crucial in supporting a deeper and more applied understanding of the subject matter. Doodly, with its ability to produce interactive and engaging visual content, enables students to relate physics theory to phenomena they encounter in their daily lives. This makes physics learning not only more interesting but also easier to understand, as students can see the application of these concepts in their own lives (Ekawati et al., 2022; Kusumaningtyas et al., 2023)

However, before such digital teaching materials are widely implemented in classrooms, it is

crucial to validate their quality and effectiveness. This validation aims to ensure that the materials align with educational objectives and can be used effectively by students. In this study, the validation process was carried out by experts in the field, focusing on three main aspects: presentation feasibility, content quality, and language use in the teaching materials. The validation was performed using the Aiken validity index, which was used to assess how well teaching materials meet the established criteria (Malina et al., 2021). The expert validation results are shown in Table 3.

Table 3. Validation results of digital physics teaching materials with the help of the doodly application

Aspect Evaluated	Validation Score	Category
Presentation Feasibility	0.89	High
Content Quality	0.86	High
Language	0.89	High
Overall	0.88	High

The results of this validation process show that digital teaching materials developed using Doodly received excellent scores in all aspects evaluated. The first aspect evaluated was the presentation feasibility. With a score of 0.89, which falls into the "high" category, this indicates that presentation of the material, whether in form of videos, diagrams, or animations, is very appropriate and effective for the intended audience, in this case, students. This engaging and interactive presentation will certainly increase students' interest in learning and help them better understand the material presented (Putra et al., 2021).

Additionally, the second aspect evaluated was the content quality of the teaching material. The score of 0.86 in this aspect also falls into the "high" category, indicating that the material presented is relevant, accurate, and aligned with the applicable curriculum. In the context of physics learning, it is crucial to ensure that the information provided is not only correct but also helps students connect theory with real-world applications. Thus, the teaching materials validated through this application are considered effective in supporting students to better master physics concepts (Putri et al., 2022).

The third aspect evaluated was the use of language in the teaching material. A score of 0.89 in this aspect shows that the language used in the teaching materials is very appropriate for the students' level of understanding. Clear and easy-to-understand language will help students focus more on learning without being burdened by complex or contextually irrelevant language (Ekawati et al., 2022).

This validation shows that the use of the Doodly application in the development of digital physics teaching materials is very effective. With engaging and well-validated content, these digital teaching materials have the potential to enhance students' learning experiences, not only in terms of understanding the material but also in increasing their interest and motivation to learn. The ability of this application to visualize complex physics concepts in the form of interactive videos and animations allows students to more easily understand difficult concepts and relate them to the real world. Therefore, applications like Doodly can be very useful tools in improving the quality of education in physics and providing a more engaging and beneficial learning experience for students (Putra et al., 2021).

Validator Suggestions

Despite the overall success of materials, expert validators offered several suggestions to enhance their quality further. These include adding a summary at the end of the videos to reinforce key points, integrating an evaluation component to assess students' conceptual understanding and application skills, refining the color contrast for better visual comfort, shortening video durations to maintain student focus, and simplifying certain animation elements for better clarity (Asyshifa Astri et al., 2024). These suggestions and comments are presented in Table 4 below.

The first suggestion provided is the need to add a summary or conclusion at the end of the video to reinforce the key points that have been discussed earlier. This aims to help students better understand and recall the main concepts that have been taught. With the addition of a summary at the end of the video, it is hoped that students can reflect on the material as a whole and clarify the core lessons conveyed in the video. The addition of this summary or conclusion can also strengthen students' understanding of more complex material (Malina et al., 2021).

The second suggestion concerns the evaluation that includes students' ability to explain physics concepts, their analytical skills, and the application of physics concepts in real-world situations. The validator suggests that the educational video should include a more in-depth evaluation that measures how well students understand the material, not only in terms of knowledge but also in applying relevant physics concepts. This comprehensive evaluation will provide a clearer picture of how well students can master the material being taught (Billah, 2019).

The third suggestion is related to a slight revision of the visual aspect of the video, particularly regarding color contrast. According to the validators, selecting softer and less striking colors could enhance the visual comfort for students. This is important because overly sharp or bright visuals can distract students' concentration, especially during extended viewing. By using softer color contrasts, students can focus more on the material being taught without being distracted by other visual elements (Sumarni, 2023).

Table 4. Summary of validator suggestions

Validator I	Validator II	Validator III
It is recommended to add a summary or conclusion at the end of the video to reinforce the key points that have been discussed earlier.	It is necessary to add an evaluation that includes students' ability to explain concepts, their analytical skills, and the application of physics concepts.	There are a few revisions needed regarding the color contrast, and perhaps a softer color combination could be chosen. The video also has a relatively long duration because the animation process appears quite complex or the steps are lengthy, such as character coloring and writing element illustrations. It would be better if the character were fully formed and colored immediately, making the duration more efficient and the delivery of the material more effective.

The next suggestion pertains to video duration, which was considered too long. Videos that are too lengthy can cause students to lose focus and have difficulty maintaining concentration throughout. Therefore, the validator recommends shortening video duration to make it more efficient and effective in delivering material. A shorter video duration will make the content more concise and focused without reducing the quality of the information being delivered. Additionally, this will help students absorb the information better without feeling fatigued (Br Ginting & Sari, 2022). Finally, the validator also suggested improvements related to animation elements in the video. The animations used in the Doodly application are helpful in explaining complex physics concepts, but some parts of the animation were deemed still needing simplification. Animators need to pay attention to complexity of the animation to avoid making it too complicated and confusing for students. By refining these elements, it is hoped that educational videos using Doodly application will be more effective in delivering physics content to students (Billah, 2019).

Although the digital physics teaching materials using the Doodly application were deemed feasible and effective, the results from the validator's suggestions indicate that there are still several improvements needed, particularly in terms of visual presentation, video duration, and material evaluation. By considering these suggestions, the quality of the teaching materials can be improved, making them more effective in supporting an engaging and easily understandable learning process for students (Asyshifa Astri et al., 2024). The summary of the comments, suggestions, and improvements can be seen in Table 5.

Table 5. Summary of comments, validator suggestions, and improvements

No.	Comment	Validator Suggestion	Improvement Result
1	No summary or conclusion at the end of the video.	Add a summary or conclusion to reinforce the key points.	Added a conclusion to summarize the main concepts for better retention.
2	Evaluation does not cover students' ability to explain physics concepts.	Add an evaluation to assess students' application of concepts.	Added questions assessing students' understanding and application of physics in real-life scenarios.
3	The color contrast is too harsh.	Revise the color contrast to a softer combination.	Adjusted the color palette for a more comfortable viewing experience.
4	The video duration is too long.	Shorten the video to make it more concise and focused.	Reduced video length to improve student engagement without compromising content quality.
5	The animation is too complex.	Simplify the animations for better clarity.	Simplified animations to ensure that students can easily grasp the concepts being taught.

The table above summarizes the comments, validator suggestions, and improvements made to the digital physics teaching materials based on the Doodly application. One of the main suggestions provided was the addition of a summary or conclusion at the end of the video to reinforce the key points discussed earlier. This aims to help students more easily recall the material that has been presented. The validators also recommended that the evaluation in the video should not only measure students' knowledge but also their ability to explain physics concepts and apply them in real-life situations. As a result, evaluation questions that assess students' analytical skills and application of physics concepts were added (Apriansyah, 2020).

The visual aspects were also a focus, with a suggestion to revise the color contrast, which was too harsh, to make it softer and more visually comfortable. The video duration was also considered too long, which could reduce students' focus, so the video was shortened to make it more efficient. Finally, the validators commented on the complexity of the animations used, which could confuse students. As an improvement, the animations were simplified to facilitate student understanding (Rahmaniyah & Anggaryani, 2023). Overall, these improvements aimed to enhance the quality of the teaching materials to make them more effective in supporting an engaging and easy-to-understand physics learning process.

The results of this study align with findings from previous research on the benefits of using multimedia technology, particularly animation, in teaching physics. According to Rahmaniyah & Anggaryani (2023), the importance of animation-based video learning media in improving student learning outcomes is highlighted, which is consistent with the findings in this study that animation can help students understand abstract physics concepts. Sukarini & Manuaba (2021) also demonstrated that animated videos are effective in improving learning outcomes in science subjects, which aligns with the results found in this study, where the use of Doodly animation enhanced students' understanding of physics content. Additionally, research by A. K. Hidayati et al. (2023) revealed that animation-based learning applications can improve students' critical thinking skills and science literacy. This aligns with the goals of this research, which aims to create teaching materials that stimulate students' critical thinking through the use of animation. However, despite the many studies supporting the use of animation and multimedia in physics education, there is still a gap in its implementation, particularly in certain areas like Gowa Regency, Indonesia. As revealed in this study, teachers in Gowa Regency are still not familiar with applications like Doodly, which hinders the potential integration of animation in physics teaching. This study fills that gap by developing more interactive and innovative teaching materials using Doodly, which can be used by teachers to enhance student engagement.

The implications of this study are highly relevant to the current needs of education in the digital era. As technology continues to evolve, it is crucial for education to adapt in order to take advantage of available digital tools to enhance the learning experience. The use of applications like Doodly in the development of physics teaching materials can help teachers introduce complex physics concepts in a way that is easier to understand and more engaging for students. This can contribute to improving students' understanding of physics concepts, while also supporting the development of teachers' digital competencies, which is increasingly important in modern education. This study also shows that the use of animation-based teaching materials can increase student engagement in learning. With more engaging and interactive materials, students can become more actively involved in the learning process, which in turn can boost their motivation to learn. Moreover, with animation-based evaluations, students can receive immediate feedback, helping them better understand the material.

CONCLUSION

This study successfully developed Doodly-based physics teaching materials that enhance teachers' digital competencies and increase student engagement in learning. The integration of multimedia elements such as animations, images, and audio proves effective in improving the comprehension of complex physics concepts. Expert validation confirmed the high quality of these materials, with excellent scores in presentation feasibility, content quality, and language use. The Doodly-based teaching materials are shown to be a valuable tool for modernizing physics education and supporting the development of teachers' digital skills. However, the study is limited to the Gowa region, and future research involving other regions and larger sample sizes could provide broader insights into the effectiveness of Doodly in physics education. By providing an innovative approach to teaching physics, this study contributes to the broader movement of digital education and highlights the importance of interactive,

multimedia-based teaching materials in fostering better student learning outcomes.

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