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Developing innovative learning media using *Wordwall Application* to foster teachers' competency

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ABSTRACT

The integration of technology in education remains a challenge for many teachers, hindering their ability to improve learning quality. According to the 2024 Education Report Card, there was a 3.72% decrease in learning quality compared to 2023, indicating the need for innovative solutions. One potential solution is the Wordwall application, which enables the creation of interactive learning games and activities. This study aims to develop Wordwall-based learning media to enhance teachers' performance and competency in utilizing technology for teaching. The study employs a Research and Development (R&D) methodology, involving stages of needs analysis, design, development, validation, testing, and evaluation. The subjects of the study were elementary school teachers who participated in trials using the developed Wordwall media. Findings show a significant improvement in teachers' competencies, with their understanding and application of technology in teaching increase from 75% to 95%. Additionally, the use of Wordwall application allowed teachers to design more interactive and engaging learning activities, which fostered greater student involvement. The evaluation also revealed that the learning media was easy to use and well-received by teachers. The study concludes that Wordwall application-based learning media effectively supports teachers in enhancing their teaching performance, offering a practical tool for integrating technology into the classroom.

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Introduction

The educational landscape in Indonesia is fraught with multifaceted challenges, primarily revolving around the quality of teaching, inadequate infrastructure, and curricula that often fail to meet national standards. A significant body of research indicates that one of the primary barriers to enhancing educational outcomes is the suboptimal quality of teaching, which stems from teachers' insufficient qualifications and experience (Basri & Hasri, 2024; Chen, 2024; Hakimi et al., 2024). Furthermore, the lack of adequate

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infrastructure and the relevance of the curriculum to current needs exacerbate these challenges (Layyina et al., 2023; Swennen, 2024). Addressing these issues requires a multifaceted and collaborative approach, involving not only the government but also community stakeholders and the private sector (Abulibdeh et al., 2024). A concerted effort must focus on the development of robust teacher training programs and the enhancement of educational facilities to create a more conducive learning environment.

The National Education Standards (SNP), outlined in Government Regulation No. 19 of 2005, play a pivotal role in improving the overall quality of education in Indonesia. These standards are designed to ensure that all levels of education adhere to certain criteria that safeguard educational quality (Mujiburrohman & Putri, 2025). However, the implementation of these standards has encountered numerous challenges, including inequitable access to education and regional disparities in the achievement of learning outcomes (Intan et al., 2024). Therefore, it is essential to develop sustainable and strategic policies that not only promote equitable educational opportunities but also address the persistent gaps in educational quality across the nation.

In line with this vision, the Indonesian government has recently issued Minister of Education, Culture, Research, and Technology Regulation No. 53 of 2023 on Quality Assurance, reinforcing the importance of adhering to National Higher Education Standards (SN Dikti). These standards now include updated benchmarks for research and community service, reflecting a broader scope that acknowledges the evolving demands of modern education (Helda & Syahrani, 2022). By expanding these standards to cover these new dimensions, the regulation highlights the need for educational institutions to be more responsive to the rapid advancements in science, technology, and societal development (Sukmayadi & Yahya, 2020; Zamili, 2021). This comprehensive approach not only emphasizes academic quality but also calls for higher education institutions to integrate innovative technological solutions in their curricula and teaching methods. Educational technology, in this context, plays a pivotal role in ensuring that institutions meet these evolving standards (Gayatri et al., 2022). The regulation encourages the adoption of digital tools and platforms to enhance the learning experience, support research, and improve community engagement. This aligns with global trends where educational technology is seen as essential for fostering a more interactive, personalized, and effective learning environment. By embracing such tools, institutions can better prepare students for the demands of a technology-driven society, ensuring that the quality of education remains relevant and adaptive to the times.

The implementation of these educational policies, particularly in relation to process standards, is crucial in determining the quality of learning. The process standards, which include learning processes, assessment methods, and management standards, emphasize the use of interactive, inspiring, and participatory teaching strategies (Muktiarni et al., 2025). Despite these clear directives, the practical outcomes remain disheartening. For instance, the 2024 Education Report Card highlights a concerning 3.72% decline in learning quality compared to the previous year, with a particularly low percentage of educators employing innovative teaching methods (55.42%) and integrating modern practices (46.26%) (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2024). Such figures point to significant gaps in the adoption of best practices, as stipulated in the Ministerial Regulation No. 53 of 2003, which advocates for diverse learning resources and the creation of a stimulating learning.

At Kurnia Middle School, for example, the lack of sufficient learning resources—such as projectors and reliable internet access—impedes the effective use of technology in teaching. Though many teachers possess personal laptops, the absence of adequate infrastructure limits their capacity to engage students and implement modern teaching strategies. This deficiency, combined with the restrictive policy on student mobile phone usage, further stifles creativity and student engagement (Daulay et al., 2022). In classrooms where projectors are available, educators primarily use conventional methods like PowerPoint presentations or YouTube videos, while those without access rely on

printed materials such as images and text. This reliance on simplistic teaching media underscores a broader issue: the insufficient motivation among educators to participate in professional development opportunities focused on enhancing their media and teaching skills. This lack of engagement contradicts the ideal profile of a competent educator, who is expected to continuously refine their pedagogical skills to provide the best possible learning experiences for students.

To address these deficiencies, professional development programs must focus on improving educators' ability to develop innovative learning media. As stipulated in Government Regulation No. 19 of 2005 (Febriana, 2019), one key competency for teachers is pedagogy, which includes the ability to create and utilize effective learning resources. One promising avenue for achieving this goal is through the development of innovative learning media, such as the Wordwall application. According to Caena and Redecker (as cited in Tammets et al., 2022), educators must possess a solid foundation in technological, pedagogical, and content knowledge, complemented by digital competence, to leverage modern educational tools effectively. Therefore, a workshop focused on developing innovative learning media using the Wordwall application was conducted, aiming to enhance educators' capacity to integrate technology into their teaching practices. This initiative not only helps teachers develop new media but also equips them with the skills necessary to adapt these tools for formative assessments in the classroom.

Aligned with the research focus, the present study aims to achieve three key objectives: (1) to explore the development procedures, (2) to assess the feasibility, and (3) to evaluate the effectiveness of Wordwall-based innovative learning media in enhancing teachers' competencies. Previous research (Abdillah & Syaban, 2023; Sufraini et al., 2024; Utami, 2024), often treated the development of innovative learning media and teacher competency separately. This study seeks to bridge this gap by investigating both aspects in tandem, focusing on how the development of media can directly contribute to improving teacher performance. The research will evaluate the impact of innovative media development on teacher competencies at Kurnia Middle School, specifically targeting reflective, corrective, and innovative teaching strategies that align with the school's education goals (Wayan, 2022).

This study is situated within the broader field of educational technology, particularly in the areas of media development and evaluation. Using the ADDIE model, the researchers aim to systematically design, develop, and assess the effectiveness of Wordwall-based learning media. The expected outcome is a more interactive and effective learning environment that not only enhances students' understanding but also motivates teachers to continually innovate in their instructional methods. The study provides concrete solutions to the educational challenges and offers a valuable reference for other educational institutions aiming to integrate technology into their teaching practices.

Method

Research Design

The research methodology employed in this study is the Research and Development (R&D) approach, a widely recognized method used to create and evaluate products or innovations aimed at addressing specific educational needs (Widyastuti, 2019). The primary objective of R&D is not only to develop a particular product but also to assess its effectiveness through iterative testing and refinement during the development process (Suryani & Setiawan, 2018). In the context of this study, the product under development is innovative learning media using the Wordwall application. This application was chosen due to its potential to create interactive and engaging learning experiences that foster greater teacher and student involvement in the learning process.

To guide the development of this educational tool, the research follows the ADDIE model (Nadiyah & Faaizah, 2015), a comprehensive framework for instructional design

that emphasizes systematic stages of development. The ADDIE model is widely regarded for its effectiveness in creating high-quality educational resources through five key phases: Analysis, Design, Development, Implementation, and Evaluation (see Table 1). In this study, the development procedures adhere to the ADDIE model's structure, ensuring a methodical approach to the creation and testing of the Wordwall-based learning media. The following sections outline the specific procedures followed by the researchers, adapted to fit the ADDIE framework, to ensure a structured and evidence-based approach to the development and evaluation of the learning media.

Table 1. Procedure of the ADDIE Model

	Draft	**Procedure**	**Results**
Analysis	Identifying problem gaps in the development of learning media and the competence of teaching staff	1. Analyze existing gaps 2. Confirming potential user media 3. Identify available resources	Analysis conclusion
Design	Designing innovative learning media	1. Make *flowchart* 2. Compile the initial product 3. Determine the final product format 4. Create a testing strategy	Initial product
Development	Develop and validate media based on existing media developed previously in small group tests	1. Developing media 2. Developing guidelines for teaching staff 3. Carry out formative revisions	Innovative learning media
Implementation	Conduct media trials on large groups	Preparing teaching staff for large group trials	Implementation strategy
Evaluation	See feedback from implementation. Whether or not the implementation is in line with what has been planned	1. Determining criteria 2. Selecting evaluation tools 3. Conduct evaluation	Evaluation plan

Participants

The research subjects were selected from the teaching staff of Kurnia Middle School using a nonprobability sampling technique. This approach does not provide equal opportunities for every element of the population to be chosen as part of the sample, resulting in a sample size of 10 individuals. Among these, two teaching staff members were selected for the small-scale trial based on their varying levels of computer proficiency. This targeted selection allowed for a nuanced evaluation of the feasibility of the developed Wordwall-based innovative learning media. In contrast, the remaining eight teaching staff participated in the large-scale trial, which served two purposes: to validate the findings from the small-scale trial and to assess the effectiveness of the media in enhancing the teachers' competencies in developing innovative learning tools using Wordwall application.

Data Collection and Analysis

Data collection techniques at the needs analysis stage were obtained through observation, interviews, documentation, and questionnaires using non-test methods, conducted between the researchers and resource persons. Following these activities, non-test questionnaires were distributed to the teaching staff. In addition, questionnaires

were provided to experts in media, learning design, and materials, along with feedback from both small and large groups of teaching staff regarding the media being developed. Beyond non-test methods, the research also incorporated test methods, specifically pretests and posttests, where statements were provided during small and large group trials. Table 2 shows the results of an interview with the Vice Principal of Curriculum Affairs, who discussed the school environment with a focus on the quality of learning. This included aspects such as supervision implementation, teaching methods, available facilities, and assessments reflected in the education report cards. The interview highlighted both the strengths and weaknesses within the Kurnia Middle School environment, providing insights into how the effectiveness of learning experiences can contribute to improving the competencies of teaching staff.

Table 2. Interview Results with Vice Principal of Curriculum Affairs

No	Questions	Answers
1	Regarding the teaching performance of the teaching staff, at Kurnia Middle School, how often is supervision of teaching performance carried out in one learning year?	Supervision is carried out twice a year, namely in odd and even semesters. Usually supervision is carried out after PTS or in the 4th month of each semester
2	In the learning process, do the teaching staff use the student center or teacher center method? Or in using learning strategies, do you use expository or inquiry strategies?	In the class that I supervise, some of the teaching staff use expository strategies, still lecturing or dictating. It's just that this strategy is implemented by senior teaching staff, but there are also some young teaching staff whose basics are not from the education department. For young educators, there are several who implement inquiry strategies
3	In the learning process, do you use personal facilities such as laptops or school facilities? What are these facilities?	For teachers who have personal laptops, they will use their laptops and use the infocus provided by the school. It's just that only 3 Infocus items are available, so not all teaching staff can use Infocus
4	Do you, your teaching staff, utilize application-based learning media to improve the quality of learning? (such as YouTube applications, Quizizz, Kahoot, Wordwall etc.)	Yes, teachers who have the opportunity to use Infocus usually use internet-based applications for learning
5	Based on your observations during supervision, are there any obstacles in the learning process?	There were no obstacles that I found during supervision, perhaps because the students were afraid of my presence, so they paid close attention to the teaching staff. But when wk. I supervise the curriculum, sometimes there are students who are caught sleeping in the back row, or students who chat with their classmates when given directions by the teaching staff. However, these obstacles can be overcome directly by the teaching staff in the classroom
6	The quality of learning is included in the assessment of the Kurnia Middle School education report card. What are the results of the 2024 education report card? Is there an increase or decrease?	For 2024, education report cards for learning quality indicators will decrease by 3.72%. This education report card is in synergy with Sulingjar, perhaps at the beginning of the year the teaching staff filling out the Sulingjar questionnaire did not use inquiry strategies or innovative learning media very often.

Based on point 6 in Table 1, the researchers further investigated the issues faced by Kurnia Middle School through documentation. Figure 1 illustrates the findings from the researchers' analysis of the learning quality indicators presented in the Kurnia Middle School education report card. The results of this assessment highlight key areas that require improvement to enhance the competency of the teaching staff. Furthermore, Table 3 shows the results of a questionnaire on need analysis to teaching staff, outlining a series of questions aimed at evaluating the use of learning models, the availability of learning facilities, and the use of learning media. This questionnaire presents 2 alternative answers, yes and no or with adjusted answer choices, as well as presenting 1 alternative answer in the form of a paragraph.

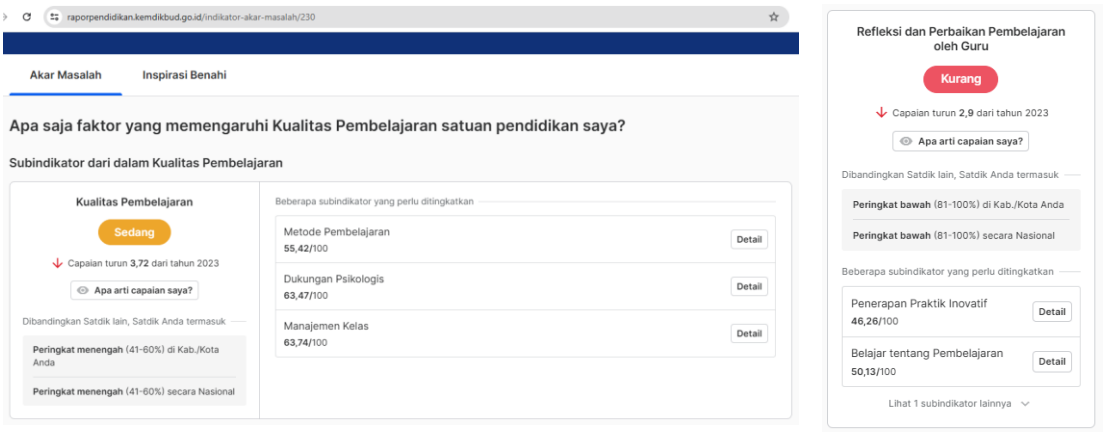

Figure 1. Results of Education Report Documentation

Table 3. Need Analysis Questionnaire

No	Questions	Answer Choices	
1	In learning activities, what learning approach do you use in learning activities?	Student Center	Teacher Center
2	Do you have the means to deliver lesson material? (Example: personal laptop)	Of	No
3	When learning started, did the teaching staff use a laptop device?	Of	No
4	Do you always teach in class?	Of	No
5	Apart from textbooks, are there other learning media that educators use? If there is, please state the type of learning media (example: powerpoint, video, teaching aids, etc.)	Paragraph	
6	To improve the quality of learning, do you use applications such as YouTube, Edmodo, Quizizz, Wordwall, etc.? Please state what applications you have used, if you haven't, please leave the answer column blank	Paragraph	
7	According to the teaching staff, are there any obstacles you feel in the learning process in the classroom?	Paragraph	
8	Based on the obstacles that you mentioned above, are there any solutions that have been implemented to overcome these obstacles? Like what?	Paragraph	

The eligibility criteria for innovative learning media are measured based on the percentage score, obtained from the following Formula 1. Moreover, the percentage results of eligibility criteria are categorized into four levels, very good, good, sufficient, and not feasible, as shown in Table 4.

$$P = \frac{x}{xi} \times 100\% \quad \text{..... (1)}$$

Table 4. Eligibility Criteria

Scale (%)	Eligibility Criteria
85 – 100	very good
65 – 84	good
45 – 64	sufficient
0 – 44	not feasible

Furthermore, to obtain the N-gain score, Formula 2 is used. The N-gain value is then categorized into four levels, effective, quite effective, less effective, and ineffective, as presented in Table 5.

$$N - Gain = \frac{posttest - pretest}{maksimum\ score - pre\ test\ score} \quad \text{.....(2)}$$

Table 5. Conversion of N-Gain Values

N-Gain Value	Category
< 40	Ineffective
40 – 56	Less effective
56 – 75	Quite effective
>76	Effective

Results

Analysis

The needs analysis stage is crucial for understanding the underlying issues within the educational context under study. In this phase, researchers sought to gather comprehensive information about Kurnia Middle School by utilizing various data collection methods, including observations, interviews, and documentation reviews of educational reports. Through these methods, the researchers identified significant problems impacting the school's educational quality, particularly the declining percentage of learning quality as reflected in the school's education report cards. This alarming trend highlighted the urgent need for interventions aimed at improving teaching methods and learning outcomes. The findings from this analysis served as a foundation for the development of innovative learning media. Furthermore, the need for workshops to enhance the development of such media was also emphasized, as it would directly address the competencies of the teaching staff in using modern tools to improve their pedagogical practices.

Subsequently, the researcher systematically organized, identified, and analyzed the collected data to derive actionable insights that could guide the design of appropriate solutions. One key aspect of this process was the distribution of questionnaires to the teaching staff, which played a critical role in determining the specific types of innovative learning media required. The responses from these questionnaires provided valuable input for shaping the development of the Wordwall-based learning media. The ultimate goal of this initiative is to enhance the teaching staff's competency in utilizing digital tools to create engaging and effective learning experiences. By implementing Wordwall, the researchers aim to make it easier for educators to deliver material interactively, thereby fostering more dynamic and innovative classroom practices. This aligns with the overarching objective of improving the overall quality of education at Kurnia Middle School through the application of contemporary teaching practices.

Design

In the design stage, the researcher developed a comprehensive plan based on the insights gathered during the needs analysis phase. The design process began by creating a sequential flowchart to clearly visualize the structure and functionality of the innovative learning media using the Wordwall application. Figure 2 illustrates the flowchart, which served as the initial blueprint for the design and layout of the learning media. The flowchart outlines the step-by-step process involved in creating and organizing the learning content, providing a systematic approach for the design of the interactive educational tools. This flowchart is a crucial element, as it helps streamline the design process and ensures the final product aligns with the intended educational goals.

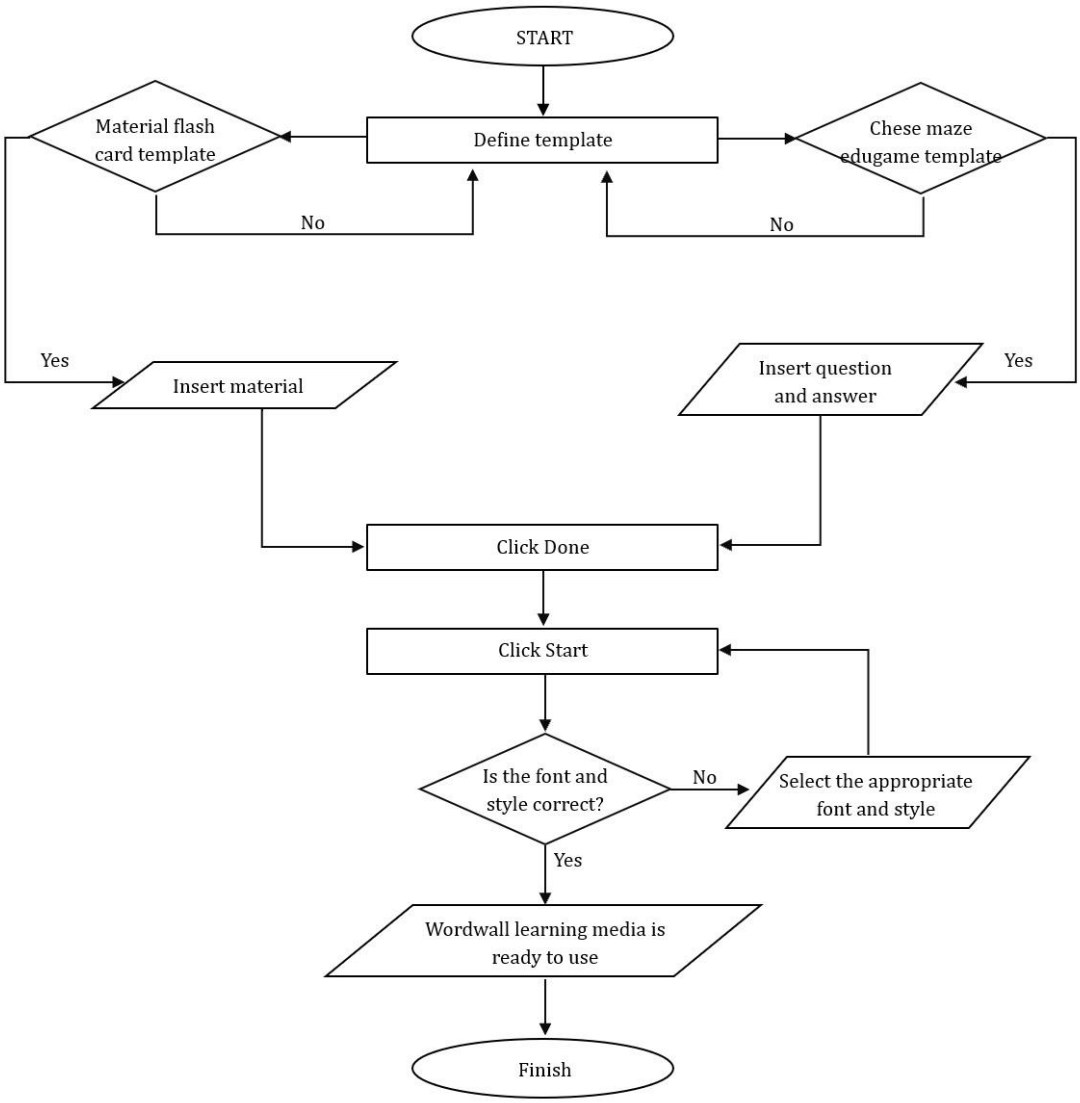

Figure 2. Flowchart of Designing Innovative Learning Media using Wordwall Application

Following the flowchart, the researcher identified suitable templates within the Wordwall application to deliver the educational content effectively. The first step involved selecting an appropriate template for presenting the material and creating educational games. For the material delivery, the researcher opted for the flashcard template, which allows for an organized presentation of the teaching content. Once the template was selected, the researcher proceeded to input the material into the flashcards. Similarly, for the educational game component, the maze template was chosen to make the learning

process more engaging and interactive. The researcher then input the questions and answers into the maze game. After completing these steps, the researcher clicked "done" and "start" to review the media. During the review, any necessary adjustments, such as font styles or other visual elements, were made to ensure consistency and readability. If adjustments were required, the researcher returned to the relevant template sections to modify the design. Once all elements met the desired standards, the Wordwall learning media was finalized and deemed ready for use in the classroom.

Development

At this stage, the researchers begin to realize the design that has been created, by combining all the content components of the media in accordance with the flowchart to become an innovative learning media with Wordwall application. At this stage the researcher carried out 3 stages, namely 1) Developing media, 2) Developing guidelines for teaching staff and 3) Carrying out formative evaluation (expert validation test and small group validation test).

Crucial elements that need to be considered in developing innovative learning media with applications Wordwall application is the right choice regarding: 1) wordwall template, 2) background style, and 3) font type. Figure 3 shows the final appearance of media-based learning Wordwall with game materials and education or formative evaluation. This section shows the home page, material menu page, game education menu page or formative evaluation.

Home page display

Learning Objectives Display

Material display *flashcard*

Material display *flashcard*

Material display *flashcard*

Game educational display

Correct answer display

Wrong answer display

Game over display

Figure 3. View of the Developed Wordwall

In accordance with the design contained in the plan, the researchers also developed guidelines for teaching staff as shown in Figure 4.

Figure 4. Teacher's Guide

The initial product that has been developed needs to be tested for validity by experts to determine the level of validity of the product. The validity test will receive a qualitative and quantitative assessment by the validator. Quantitative data is data obtained from validation scores in the form of questionnaires, while qualitative data is an instrument in the form of weaknesses and suggestions that are used as material to make improvements to innovative learning media using Wordwall application. The results of validation of media expert, learning design, and material expert are presented in Table 6, Table 7, and Table 8 respectively. Based on the results of the validation, the media developed received a score of 90%, meaning the media presented was valid (very good), the learning design was also categorized as very good with score 90%, and so is the material expert with validation score 92% (very good).

Table 6 Result of Media Expert Validation Assessment

No	Aspect	Score	Rate-rate	Presentation	Information
1	Media Quality	31	3,3	83%	
2	Presentation Quality	88	3,5	87%	
3	Language Quality	60	4	100%	
	Rate-rate		3,62	3,62	
	Presentation			90%	Very Good

Table 7. Result of Learning Design Validation Assessment

No	Aspect	Score	Rate-rate	Presentation	Information
1	Learning outcomes	6	3	75%	
2	Strategy	22	3,7	91%	
3	Evaluation	8	4	100%	
	Rate-rate		3,6	3,6	
	Presentation			90%	Very Good

Table 8. Result of Material Expert Validation Assessment

No	Aspect	Score	Rate-rate	Presentation	Information
1	Presentation Quality	4	4	100%	
2	Content Quality	11	3,7	91%	
3	Strategy	12	4	100%	
4	Language Quality	10	3,3	83%	
	Rate-rate		3,7	3,7	
	Presentation			92%	Very Good

Implementation

The results from the pre-test and post-test, as shown in Table 9, provide a comprehensive overview of the improvement in teaching staff competencies after undergoing the development of innovative learning media using Wordwall. Table 9 reveals the pre-test and post-test scores of eight teaching staff members across various departments, highlighting a noticeable increase in their performance after participating in the development program. In general, all participants demonstrated significant improvement, with post-test scores generally much higher than pre-test scores. The total pre-test score for all participants was 462, while the total post-test score increased substantially to 716, reflecting an overall enhancement in their competencies related to the use of Wordwall in educational settings.

Individually, the post-test results reveal that the majority of teaching staff members experienced a considerable boost in their ability to utilize innovative learning media effectively. For instance, A.N. (English) improved from a score of 56 in the pre-test to 89 in the post-test, while F.M.S. (Crafts and BK) increased from 54 to 89. Similarly, I.D.P. (Science) showed the highest improvement, moving from 66 to 95, indicating a remarkable advancement in their competency. The lowest improvement was observed in K.I.C. (Mathematics), who improved from 50 to 83, still reflecting a positive change. Overall, these results suggest that the development of Wordwall-based learning media effectively contributed to enhancing the teaching staff's ability to design and implement engaging, interactive learning experiences.

Table 9. Pretest and Posttest Results

No.	Name of Teaching Staff (Initials)	Department	Score	
			Pre test	Post test
1.	AN	English subject teaching staff	56	89
2.	FMS	Educational staff a Crafts and Counselling subjects	54	89
3.	IDP	Science teaching staff	66	95
4.	IR	Mathematic teaching staff	58	91
5.	KIC	Mathematic teaching staff	50	83
6.	MA	English subject teaching staff	56	85
7.	PR	PABP subject teaching staff	62	93
8.	RUM	Teaching staff at Arts and Culture Department	60	91
Amount			462	716

Evaluation

Based on the test results of the validators, it can be said to be valid (very good) for use, although the test results of the validators still need to be improved. The following Table 10 shows the average validity of innovative learning media with applications *wordwall* from the results of the validators' assessments.

Table 10. Average Score of Expert Validation

Member	Results	Category
Instructional Media	90%	Very Valid
Learning Design	90%	Very Valid
Material	92%	Very Valid
Amount	272%	
Rate-rate	91%	Very Valid

The average obtained based on Table 10 is 91% with a very valid category. Next, the researchers carried out product feasibility assessments in small and large groups and then obtained results as in Table 11.

Table 11. Feasibility of Innovative Learning Media with the Wordwall Application

In practice	Results	Category
Small Group	97%	Very Worth It
Big group	93%	Very Worth It
Material	95%	Very Worth It

The researchers tested the effectiveness of innovative learning media with the Wordwall application through pretest and posttest testing. The results of the two tests were then calculated using N-Gain, and an average N-Gain value of 0.75 or 75% was obtained and categorized as "effective". Therefore, it can be concluded that the development of innovative learning media with the Wordwall application through workshops was declared effective in increasing the competence of teaching staffs.

Discussion

In the implementation of education, the standard for the learning process emphasizes the use of interactive, inspiring, engaging, and participatory teaching methods, along with the support of necessary educational infrastructure such as projectors, internet networks, laptops, and other learning media. The theoretical implications of this research demonstrate the significant potential of enhancing learning quality by incorporating innovative practices through carefully designed learning media and teaching methods. As Ramadhani (2025) notes, aligning learning design with innovative strategies can significantly improve learning outcomes. The development of innovative learning media, specifically through the Wordwall application, serves a crucial role in integrating adaptive learning tools within the educational environment. The application's features, such as animations embedded in educational games, offer motivational support and assist students in developing critical skills. These features also ensure that students are more actively engaged, fostering better participation in the teaching and learning process (Hikma, 2024).

The high feasibility ratings provided by media, learning design, and content experts (90%, 90%, 92%, respectively) validate the practicality and effectiveness of Wordwall as an innovative learning tool. These ratings suggest that Wordwall-based media is not only viable but also highly promising for improving the quality of learning. This observation

aligns with the findings of Daulay et al. (2022), who argue that the development of innovative learning media leads to enhanced learning outcomes. The study further supports the claim that Wordwall media effectively captures students' attention and increases their enthusiasm in the learning process, ensuring they remain actively engaged throughout. Sari and Ahmad (2021) also affirm that using such adaptive media in the classroom contributes to greater student interest and motivation.

In addition, Wordwall's role in fostering innovation within learning environments can be observed in its ability to combine learning media and methods creatively. Nisa and Susanto (2022) found that the development of Wordwall media encourages creativity in blending different learning tools and techniques, which enhances the classroom learning experience. This innovation not only excites students but also motivates them to engage with the material in ways that traditional methods may not. Thus, the integration of Wordwall-based media is not just a technical enhancement but also a catalyst for fostering a more stimulating and participatory learning atmosphere.

Pedagogical competence is one of the core competencies that teaching staff must possess to improve the quality of learning. According to the research findings, the development of pedagogical competence, particularly through workshops, is vital for enhancing teachers' ability to deliver innovative and effective learning experiences. However, the study highlighted a lack of motivation among teaching staff to participate in professional development activities aimed at improving their pedagogical skills (Bukit & Tarigan, 2022). This finding underscores a significant barrier to the professional growth of teachers, which ultimately impacts their ability to implement innovative practices in the classroom. By addressing this issue through targeted interventions, such as workshops focused on the development of learning media, it is possible to enhance teachers' pedagogical competence and, by extension, the overall quality of learning.

The practical implications of the research demonstrate that the competence of teaching staff, especially in pedagogical areas, improved significantly. This improvement is evident from the increase in pretest and posttest scores, with an impressive 254-point improvement. Additionally, the N-Gain analysis resulted in a score of 0.75, categorized as high (effective), indicating that the intervention was highly successful. The study thus confirms that workshops and similar professional development activities are essential in helping teachers enhance their skills and creativity, particularly in the development of innovative learning media. Such activities not only improve teachers' pedagogical competence but also make it easier for them to deliver content in a more engaging and interactive manner, as outlined by Layyina et al. (2023). This practical implication highlights the significance of equipping educators with the tools and opportunities to improve their teaching strategies.

Beyond the direct implications for pedagogical development, this research also highlights the broader impact of innovative learning media on educational practice. Specifically, the comparison between different learning models and curricula reveals how adaptable Wordwall can be across various subjects and teaching approaches (Ella et al., 2024; Melvin, 2024). Each subject can tailor the use of Wordwall media to its specific learning model, ensuring that the learning experience is more dynamic and tailored to student needs. The research indicates that the development of Wordwall-based learning media not only contributes to the creation of valuable educational tools but also plays a crucial role in enhancing the competencies of teaching staff. This, in turn, leads to improved learning outcomes and a higher quality of education, as reflected in the education report cards.

Finally, this study points out the importance of continuing to develop innovative learning media that not only improves student learning outcomes but also fosters the growth of teaching staff competencies. The integration of adaptive learning media, such as Wordwall, makes learning more effective, creative, and participatory. The findings of this study provide compelling evidence that these tools have a positive impact on both student engagement and teaching effectiveness. However, to ensure the sustainability and

broader applicability of these tools, future research should explore their long-term effects across diverse educational contexts. Broader studies, including long-term evaluations and testing across various curricula and learning models, are necessary to ensure that these innovations remain effective and adaptable to the changing needs of education. The continued development and implementation of such educational innovations are crucial for improving the overall quality of education and ensuring that teachers and students alike benefit from ongoing progress in teaching and learning methodologies.

Conclusion

The findings from this research highlight the significant potential of using innovative learning media, specifically the Wordwall application, as an effective tool for supporting the implementation of innovative educational practices. The Wordwall-based learning media was found to be both practical and beneficial, particularly in enhancing the skills and knowledge of teaching staff, thereby improving their competency in delivering quality education. The development and use of such media were shown to have a direct, positive impact on teaching staff competence, confirming its effectiveness in supporting the broader objective of improving the quality of learning in classrooms. This underscores the importance of integrating adaptive and engaging learning tools into the teaching process, which not only motivates students but also empowers teachers to adopt more innovative and interactive pedagogical methods. The application of Wordwall as a tool for professional development highlights a promising avenue for the future of education, where continuous skill improvement and the integration of technology can contribute significantly to achieving higher standards of educational excellence.

However, it is important to acknowledge the limitations of this study. One of the primary constraints is the relatively small sample size, which limits the ability to generalize the findings to a broader population. This limitation poses a challenge to fully assessing the effectiveness of Wordwall as an innovative learning media across various educational contexts. Additionally, this research focused primarily on two aspects: the development process of Wordwall-based learning media and the impact of this media on improving teaching staff competence. While these areas were explored in depth, future studies should seek to expand the scope by including a larger and more diverse sample of educators. This would allow for a more comprehensive evaluation of the media's effectiveness across different learning environments and teaching models. Furthermore, future research could explore the development of a wider variety of learning media using Wordwall, incorporating different subject areas and teaching strategies. Long-term studies could also investigate the sustainability and lasting impact of such innovative tools on both teaching staff and student outcomes, providing valuable insights into the broader implications of integrating digital learning tools into everyday classroom practices.

Authors' Declaration

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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