



Development of digital-based crossword puzzle learning media in the Indonesian language subject grade IV SDN 009 Bina Baru Kampar

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ABSTRACT

The use of learning media must be varied, not limited to verbal communication; it must be designed creatively and innovatively and adapted to the material to be delivered. This study aims to develop digital crossword-based learning media for Indonesian language learning. The method used in this study is the ADDIE Research and Development (RnD) model. The data collection techniques used by the researcher are field observation, questionnaires, documentation, and interviews. The validation results show that the Interactive Crossword Game Media Feasibility can be determined after validity testing by three validators, namely media validators, material validators, and practitioner validators. From the third validation assessment, a high average was obtained, indicating that the Interactive Crossword Game media was considered very feasible for use. Interest in the Interactive Crossword Game Media in Learning was found after the student response test was conducted. From this student response, an average was obtained, indicating that the Interactive Crossword Game was considered very interesting to use.

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ABSTRAK

Pemanfaatan media pembelajaran harus bervariasi, tidak hanya komunikasi verbal, tetapi harus dirancang secara kreatif dan inovatif serta disesuaikan dengan materi yang akan disampaikan. Penelitian ini bertujuan untuk mengembangkan media pembelajaran Teka Teki Silang berbasis digital dalam pembelajaran Bahasa Indonesia. Metode yang digunakan dalam penelitian ini menggunakan pendekatan penelitian pengembangan model Penelitian dan Pengembangan (RnD) ADDIE. Teknik pengumpulan data yang digunakan oleh peneliti adalah dengan menggunakan metode observasi lapangan, kuesioner, dokumentasi, dan wawancara. Hasil validasi menunjukkan bahwa Media Feasibility Interactive Crossword Game dapat diketahui setelah uji validitas oleh 3 validator yaitu validator media, validator materi dan validator praktisi. Dari penilaian validasi ke-3 diperoleh rata-rata yang tinggi, yang menunjukkan bahwa media Interactive Crossword Game ini dinilai sangat layak untuk digunakan. Ketertarikan pada Media Permainan Teka-teki Silang Interaktif dalam Pembelajaran dapat ditemukan setelah tes respon murid dilakukan. Dari hasil respon murid ini diperoleh rata-rata yang menunjukkan bahwa media dari Game Teka-teki Silang Interaktif ini dinilai sangat menarik untuk digunakan.

Kata Kunci: media digital; media interaktif; teka-teki silang

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INTRODUCTION

In the direct learning model, learning media refers to how teachers function as providers of information and convey learning messages. In this scenario, teachers must use various media. Educational media facilitate the teaching and learning process. The learning process can be stimulated by anything that motivates students' thoughts, emotions, focus, and skills. Between the source and the receiver, learning media serve as mediators, conveying information or messages for instructional purposes (Oktaviana & Ramadani, 2023). Everything used to convey information or messages during the teaching and learning process, to arouse students' interest and excitement in learning, is considered a learning medium. For the learning process to run effectively, the media must act as a mediator between students and teachers. Teachers will find it easier and more efficient to teach and learn if they use teaching materials.

In an effort to increase the success of the learning process, teachers are important players. As the implementers of the learning process, teachers must know the material and use methods that make learning fun. This aligns with educators' role in facilitating learning. One of the learning aids that significantly affects learning success is learning media (Sadikin, 2020). There are many types of interactive learning materials. Learning can be facilitated by a variety of media, such as whiteboards, magazines, textbooks, newspapers, television, and videos. However, things have changed over time, and many new teaching technologies are now available. As we know, children today like using electronic devices, so these devices can be used as an interesting educational tool. Examples include interactive PowerPoint and other games. For this research, interactive learning tools are educational games. Learning materials can be engaging when used as educational games (Kurniawan & Zabeta, 2025).

In addition to being a popular form of entertainment, games can now be used for teaching and learning activities due to technological advancements. Educational game learning materials can improve cognitive learning outcomes and increase student learning activities (Jamalludin & Prastowo, 2023; Hui & Mahmud, 2023). Games can serve as practical learning tools and fun ways to improve student learning outcomes. It is important to use tools or media that facilitate the delivery of learning materials to students so that learning goals can be achieved during the teaching and learning process. Learning materials are available in a variety of forms, from basic to advanced. The literature studied mentioned various interactive learning media, including educational games, learning films, interactive simulations, and digital learning platforms (Kustyarini et al., 2020).

The use of learning media is an integral part of the learning process because the availability of supporting media allows the process to run more smoothly (Puspitarini & Hanif, 2019). For students to develop optimally, learning materials and approaches must be dynamic, supportive, and practical, as various media and infrastructure can help stimulate students' potential (Sari et al., 2023). Communication in education must go beyond the spoken word; The media must be designed creatively and innovatively, adapted to the subject matter (Jauza & Albina, 2025). Teachers play an important role in choosing appropriate media and integrating them effectively into the lesson plan. However, the practical use of media in schools remains limited, with many educators relying on conventional lecture methods and online images, often due to a lack of teaching materials, time, and budget constraints (Sofi-Karim et al., 2023). The media used tends to be monotonous and uninteresting, which leads to low student involvement in the learning process.

Crossword puzzles are one example of an educational game. The rules of the crossword puzzle game require players to arrange letters in designated columns to find answers to questions or clues. Solving crossword puzzles can help students become more critical thinkers and think more quickly (Gulo & Muhid, 2024). In this study, the researcher referred to the media as a smart crossword quiz game, while the educational game was a crossword puzzle game. The reason for choosing a Crossword is that, when used

as a learning medium, it can increase students' motivation to learn and facilitate deep understanding by incorporating fun elements that make the learning atmosphere more lively (Wana, 2021).

The average score of students in Indonesian subjects was 65-70, according to observations by researchers at SDN 009 Bina Baru Kampar, in collaboration with Mrs. HS, the homeroom teacher for grade IV at the elementary school. KKTP does not display many student scores. SDN 009 Bina Baru sets the KKTP at 75 for Indonesian language courses. The lack of diverse learning materials or the reliance on traditional teaching methods is the leading cause of low student learning outcomes. In addition to low student learning outcomes, teachers remain the center of classroom instruction in Indonesia, where they continue to deliver material using traditional, especially lecture-based, teaching methods. Students are more preoccupied with their own world and often share stories with their friends, which ultimately results in a lack of understanding of the subject matter. This makes the learning atmosphere boring for them. Along with these observations, the results of the first interview with the fourth-grade teacher at SDN 009 Bina Baru revealed that the teacher admitted his students often had difficulty following his lessons because the system was repetitive or similar. The teacher stated: *"I also admit that the learning activities I convey are still not optimal because there is no more diverse learning resource than PowerPoint"*.

The lecture approach is the only way for the learning process to continue. Thus, it seems that educators must use various digital media, according to the interview results. The researchers ultimately decided to focus on the adoption or use of digital-based crossword learning materials in this study because of this issue and the relative effectiveness of several previous studies. In addition, successfully conducted research on the use of crossword learning materials in education—Biological Movement Systems Material: Using Crossword Puzzles to Improve Student Learning Outcomes. The study was divided into two cycles, with tests administered at the end of each cycle to assess student learning outcomes. The results showed that student learning outcomes increased, from an average of 39.90 in the poor category to 79.70 in the good category, indicating that the crossword puzzle learning media can improve the learning outcomes of biology students in the motor system material (Majid & Suyadi, 2020). This research aims to develop a digital-based crossword learning media for Indonesian subjects in Class IV of SDN 009 Bina Baru Kampar.

LITERATURE REVIEW

Learning Development

Expansion is a development in the Great Dictionary of the Indonesian Language. Development is the application of technical knowledge to create new equipment or materials. Before the start of commercial production, production and services increased significantly, even before the introduction of new processes or systems. To plan everything that will be used in the learning process while still paying attention to students' abilities and potential, development involves creating a logical, methodical learning plan. Development is the process of expanding or combining learning materials to create physical products. Learning development is a logical, methodical process for planning what to use in the learning process, taking into account students' abilities and potential (Kholifah & Rahma, 2024).

The development of learning is based on the advancement of science and technology, which has transformed almost every aspect of human life and created several problems that can only be solved by a better understanding and further advancement of these areas. In addition to the advancement of science and technology, the growth of education is also driven by parents' increasing awareness of the importance of quality education for their children, leading to a greater demand for quality schools and a growing preference for low-quality schools (Majid & Suyadi, 2020). Therefore, learning activities should not be limited to knowledge delivery, as this can cause boredom for both teachers and students and make it difficult to increase motivation and learning outcomes. Therefore, a new step is to find ways to change the teaching and learning paradigm so that the process is more relaxed and fun.

Instructional Media

Media can be used as a tool to achieve learning goals, and it is hoped that students will more easily understand the information provided by the teacher if media is used. Learning objectives can be optimally achieved when the learning process becomes more enjoyable, and students become more interested in the instructor's content (RimahDani et al., 2023). The word medium comes from the Latin *medius*, which means middle, intermediary, or introduction. Media in Arabic means intermediary. In the teaching and learning process, media are usually understood as electronic, graphic, or photographic tools used to record, process, and rearrange oral or visual information. The term "media" can also refer to anything visible that serves as a channel, mode, or instrument for communication (in the teaching and learning process). Media, in its strictest sense, refers to the tools and resources of a learning system. To achieve specific learning goals, media refers to the full utilization of all the components of the learning system and the resources mentioned (Nurhasana, 2021).

According to the learning media, it is a physical or non-physical tool deliberately used as a bridge between teachers and students to help them understand learning materials more effectively and efficiently. Learning media can stimulate students' curiosity and encourage more active learning. Hamka, in a book entitled "*Konsep Dasar Media Pembelajaran di Era Digital*" states that everything around people, objects, or environments can be used to convey learning messages, arouse students' interest and attention, and channel their ideas and emotions in learning activities. Various perspectives on the limitations of learning media lead to the conclusion that learning media is anything that can convey a message through various channels, such as evoking students' emotions, thoughts, and desires, intending to support the development of an efficient learning process and provide messages with new information to help them achieve learning goals.

Functions of Learning Media

The purpose of media in education is to engage students with the content they encounter. One of the main goals of learning media is to assist teachers in delivering open content according to the environment during learning activities (Suparlan, 2020). There are several learning functions, including attention function, which is a function to attract students' attention so that they concentrate on learning related to the visual learning media displayed, affective function, which is to attract students' attention and concentration by using pictorial learning media, and compensation function, which is visual media that is useful for knowing students' interest in reading. Learning media is used by teachers to deliver learning materials in class. Learning media has several purposes, namely: delivering learning materials, making the learning process more interactive, making learning more engaging for students, improving learning outcomes, and increasing the effectiveness of the teacher's role (Hasibuan & Anas, 2025; Saputra et al., 2025).

Crossword Puzzle

Some games have educational value, such as crossword puzzles. Playing a crossword puzzle involves using letters to fill in the blanks in the white squares. The program then uses the prompts to create a word. Secret photos serve as clues in this modified crossword puzzle game, and children must guess the word based on the picture's attributes (Marcello et al., 2023). Children can improve their activities and learning outcomes by solving crossword puzzles, thereby enhancing their reading skills. To strengthen children's memory, they are instructed to condition their minds to remain calm, comfortable, and clear when solving puzzles (Sulistri & Suprpto, 2024). From this point of view, modified crossword puzzles are exercises that

help children improve their reading and memory skills by having them fill in letters in a black-and-white square box according to picture-based instructions.

Crossword puzzles help students develop critical thinking skills and gain new knowledge in a subject by exercising their brains (Malini et al., 2019). When used as a skill-learning tool, crossword puzzles can increase students' motivation to learn and facilitate deep understanding by incorporating game elements that create a fun learning environment (Moetia, 2025; Zamani et al., 2021). Since crossword puzzles involve play and make it easier for teachers to achieve learning goals, it can be concluded that their purpose in the educational process is to provide students with a sense of fun while following the teacher's instructions. This will increase students' motivation and enthusiasm for the material.

METHODS

The research strategy for developing the ADDIE Research & Development (R&D) model is the methodology used in this study. This research was conducted at SDN 009 Bina Baru Kampar, located at Karya Bakti, Jalan Poros, Bina Baru, Kec. The research time used is January - May 2025. The crossword game is the subject of research because it is a learning tool for Indonesian learners in grade IV. The findings of this research can be applied as a substitute medium to enhance grade IV students' ability to learn Indonesian and improve their academic achievement.

Interviews, questionnaires, documentation, and field observations are methods researchers use to collect data. Once the data is collected, the analysis is performed. Validation of the needs questionnaire is part of the analytical approach used in this study. This research follows a development research design that aims to produce and test the effectiveness of digital-based crossword puzzle learning media for Indonesian subjects in Class IV at SDN 009 Bina Baru Kampar. The development process is carried out through several systematic stages to ensure the quality and feasibility of learning media. The first stage is analysis, in which the researcher identifies learning needs, analyzes the curriculum, and examines student characteristics to determine appropriate content and features for crossword puzzle media. This stage also includes a review of existing media and the identification of gaps that new media will address. The second stage is design, in which learning media are conceptualized and planned. This includes designing interfaces, crossword questions, and interactive elements that align with the Indonesian curriculum and learning objectives.

The third stage is the development stage, in which the media are created according to design specifications. The crossword puzzles were programmed into a digital format, and an initial prototype was produced. The fourth stage is implementation, during which the media are tested in a real classroom setting at SDN 009 Bina Baru Kampar. During this phase, teachers and students use media, and data are collected on usability, student engagement, and learning outcomes. Moreover, the evaluation stage assesses the effectiveness and feasibility of digital crossword learning media. Feedback from experts, teachers, and students was collected through validation sheets, questionnaires, and observations. The collected data were analyzed quantitatively and qualitatively to determine whether the media improved students' understanding of Indonesian and met the required standards.

RESULTS AND DISCUSSION

Result

This research, which utilizes artificial intelligence (AI), is a form of research and development (R&D) that creates interactive, game-based learning solutions. ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation, and it is the WordWall development paradigm used. The trial data presented here are the results of this research and development:

Analysis

Knowing what grade IV students need from SDN 009 Bina Baru Kampar is the goal of the analysis stage. Interviews with the fourth-grade homeroom teacher revealed that because the teacher gave the questions on paper, students were always bored and tired during learning activities. The general classroom atmosphere during learning also reveals that students often lack seriousness in responding to lessons, joke with peers, and sometimes even fall asleep, all of which negatively impact their academic achievement. Therefore, to overcome these problems and provide students with a more engaging, dynamic, and enjoyable learning experience during teaching and learning activities, educators must be creative in selecting teaching methodologies. A substantial commitment of time and effort is required when using standardized assessment instruments in the evaluation process. This is because they have to check the students who do not complete their responses and correct each one individually. However, teachers find it easier to record students' grades thanks to tools developed by researchers. Time and effort previously required to score manually are saved by features on platforms like WordWall that create crosswords.

Design

In grade IV, the implementation process begins with the presentation of learning objectives and explanations of learning activities. Before the learning activities began, students sat neatly, and the researcher provided the medium of crossword puzzles. The media contains experimental questions relevant to the subject matter to measure students' understanding. The following is the research's crossword documentation.

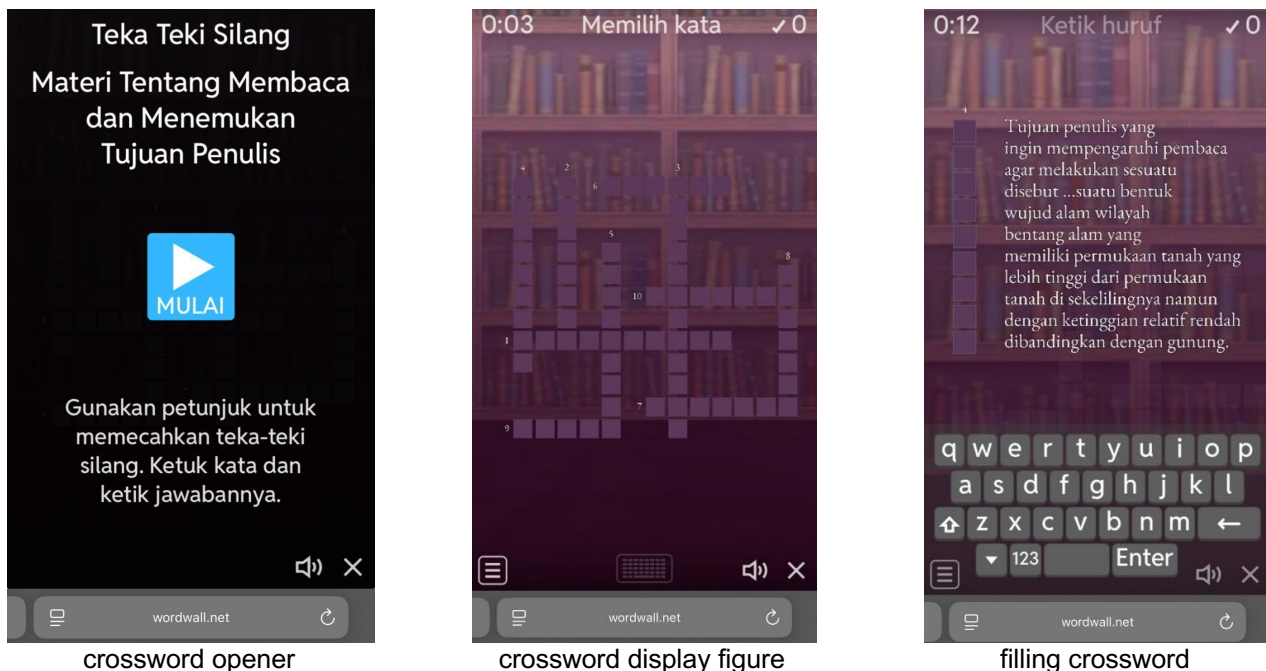


Figure 1. Design Crossword Puzzle Games
Source: Research, 2025

Figure 1 shows the design of learning media that adopts crossword puzzles to train students' critical thinking skills.



Figure 2. Crossword Filling Results
Source: Research, 2025

Figure 2 shows the design of the display of student scores, arranged in descending order from the highest score with a ranking of 1-10.

Development (Development)

Expert practitioners (homeroom teachers), media professionals, and material specialists are among the specialists who validate Crossword's final product at this stage. Validation is performed to determine whether the product is suitable for use without revision, requires revision, or is not suitable for study. During the validation process, each expert highlights specific areas based on their expertise, and the process considers various aspects. The product or the material will be changed to improve quality if there are any suggestions or criticisms to consider. Once revised, the final learning tools can be used in the research environment.

Media Expert Validation: Media experts validated the activation of the crossword in the developed crossword-based learning design. Validators are required to evaluate the learning design by completing questionnaires created by researchers and providing feedback, comments, and ideas to improve the final product.

Table 1. Media Expert Assessment Results

No	Material Expert	Valuation	
	Assessment Indicators	Validator 1	Validator 2
1	Writing forms on the crossword puzzle media	4	4
2	Color of writing on the crossword puzzle media	3	4
3	Size of writing on the crossword puzzle media	4	4
4	Composition of the color of writing on the crossword puzzle media	3	4
5	Form pictures on the crossword puzzle media	4	4
6	Selection of attractive images	4	4
7	Colors with writing on the background of the crossword media are appropriate	4	3
8	Separation between paragraphs is clear	4	4
9	Spacing between text and illustrations as appropriate	4	4

No	Material Expert	Valuation	
	Assessment Indicators	Validator 1	Validator 2
10	Illustrations and image captions are clear	3	4
11	Ease of use of media	4	3
12	Ease of learning material	3	4
13	The learning process is more interesting	4	4
14	Media content on the young crossword puzzle media is understood	4	4
15	Ease of learning	4	4
Sum		56	58

Source: Research, 2025

The results of validator assessments will be discussed in **Table 1**. Validators are currently used for feasibility studies. Validators provide applicable ratings, criticisms, and recommendations for interactive crossword puzzle game media. With 95.0% of media experts validating the Very Valid category, the average validator results in the table show that media for interactive crossword puzzle games get excellent reactions from validators. This shows that learning media products through enjoyable games, such as crossword puzzles, is recommended.

Material Expert Validation: Media experts validated the activation of the crossword in the developed crossword-based learning design. Validators are required to evaluate the learning design by completing questionnaires created by researchers and providing feedback, comments, and ideas to improve the final product.

Table 2. Materialist Assessment Results

No	Material Expert	Valuation	
	Assessment Indicators	Validator 1	Validator 2
1	Suitability of the material with core competencies	3	4
2	Compatibility of the material with the indicator	4	4
3	Covers one competency	4	3
4	The content of the material presented is appropriate	4	4
5	Completeness of the material with systematic order and arrangement	4	4
6	Sequence of material collapses	4	4
7	Correct writing format	4	3
8	Interesting font selection skills	4	4
9	Materials according to the student's ability level	4	3
10	The material is easy for students to understand	3	4
11	Material collapse with learning	4	3
12	Easy-to-understand material	4	4
Sum		46	45

Source: Research, 2025

The results of validator assessments will be discussed in **Table 2**. Learning through crossword puzzle games can be categorized as "Very Valid" based on calculations yielding a 94.8% score. This shows that this learning is worth developing.

Validation by Expert Practitioners (Classroom Teachers): This validation was conducted to evaluate learning through interactive crossword puzzle games comprehensively. Media experts and subject matter experts are among the professionals who have validated Interactive Learning. The researchers created a questionnaire for validators to fill out to evaluate the interactive learning design. They are also required to provide feedback and recommendations for improvements to the items that have been set.

Table 3. Validation by Expert Practitioners (Classroom Teachers)

Material Expert			
Assessment Indicators		Validator 1	Validator 2
The display chosen for the crossword puzzle media design caught the attention of students		4	4
According to the students, the pictures on the crossword puzzle media correspond to the material presented		4	3
The instructions in the questions presented help students in answering questions		4	4
Writing text in a crossword puzzle media makes it easy for students to read		4	4
The type of media presented is beneficial for students in learning		4	4
The language in the crossword puzzle media is easy to understand		4	3
The combination of colors, shapes, and fonts of writing in the media is very interesting		3	4
Crossword puzzle media can help students be more independent without asking too many questions		4	3
The questions given support the achievement of material competence		4	4
Media is designed to make it easier for students to learn		4	4
Sum		39	37

Source: Research (2025)

The results of validator assessments will be discussed in **Table 3**. The calculation yielded a percentage score of 95.0%, indicating that game-based learning through AI WordWall to create a crossword can be categorized as "*Very Feasible*". Based on this, it can be said that this learning progress is feasible.

Implementation

This study evaluates the creation of learning media products for interactive crossword puzzle games at the implementation level. After being approved, the learning media product was tested in grade IV at SDN 009 Bina Baru Kampar through learning exercises. To improve the content, product trials were conducted with students who had completed the survey after using the learning materials. Before using interactive teaching resources for crossword puzzle games, the researchers used a lecture-style approach rather than crossword game materials. Presenting the learning objectives to be achieved and explaining the learning activities to be completed marked the beginning of the process of implementing class IV learning. The researcher arranged the students to sit neatly before the learning activities began. Then, students are given a crossword puzzle game media that contains experimental questions related to the subject matter to measure students' level of understanding.

Data on the feasibility of interactive crossword puzzle media for increasing mathematics learning motivation were collected based on the results of their implementation. Expert validation is the benchmark for feasibility analysis. This study uses two validators: practitioners and media and material experts. With an average percentage of 86.88%, the interactive crossword puzzle media received an excellent response

from the validators, based on the average results of the two validators. Based on the implementation results, information was obtained about the appeal of interactive crossword game media in increasing learning motivation and encouraging learning mathematics. Student opinion surveys about interactive crossword game media are used to gauge how engaging the medium is. With 93.7% in the Excellent/Very Valid category, the average student response results shown in the table indicate that students react very well to the interactive crossword game medium.

Evaluation

As the final stage in the ADDIE model, this assessment aims to ensure the results and effectiveness of the research conducted. The evaluation conducted by this researcher aims to document the actions taken at each stage of development, particularly the revisions at each stage, to ensure the validity of a product that can be produced and used in the educational process. Based on validation results from the validator lecturers, the developed digital crossword media has met the feasibility standards for a learning medium. However, there are some suggestions for improvement, namely the addition of a more interactive feedback feature and adjustments to the display design to enhance user appeal. Thus, digital crossword media can be more effective in improving student learning outcomes. The revision of the digital crossword media has been carried out based on suggestions and recommendations from validator lecturers. A more interactive feedback feature has been added to help students better understand the material. The display design has also been adjusted to increase user interest and ease of navigation. Thus, digital crossword media can be more effective in improving student learning outcomes and achieving desired learning goals.

Discussion

In Grade IV at SDN 009 Bina Baru Kampar, it was found that the use of this media significantly increased students' involvement and enthusiasm in the Indonesian learning process. Students appear more focused and motivated when solving digital crossword puzzles than when using conventional teaching methods. Teachers report that the media facilitates easier delivery of material and supports more dynamic interaction between teachers and students. In addition, this media provides students with opportunities to learn independently and explore Indonesian vocabulary and content more engagingly. The observation also noted that some students initially needed a period of adjustment to become familiar with digital media; However, this challenge was overcome after several attempts. Overall, learning media has a positive impact on the classroom atmosphere, increases student active participation, and helps teachers assess student understanding more effectively (Daryanes et al., 2023).

The product in question was previously used but has since been modified or developed into a specific product. However, the media itself has a meaning as a tool used by teachers to help students learn to achieve the desired goals. Using images or text of their choice, users can create their own puzzles or puzzle games in WordWall to make a crossword. The program can be used to create a variety of puzzles, including Sudoku, crossword puzzles, and jigsaws (Kubala, 2023; Markaki & Panagiotakis, 2023). The researchers used ADDIE's five-stage research model for analysis, design, development, implementation, and evaluation when creating interactive crossword game media for learning. Crossword puzzles help students develop critical thinking skills and acquire new knowledge in a subject by exercising their brains (Malini et al., 2019). Crossword as a learning media effectively enhances memory, concentration, analytical skills, and thinking ability (Rahmania & Supriansyah, 2025). Based on this understanding, academic work on media development is consistent. Interactive learning media, which consist of audiovisual elements, increase learning motivation (Rahayu et al., 2023; Rosyiddin et al., 2023; Sadiq, 2024).

The latter is considered interactive because it contains active student reactions. The following are the steps involved in creating interactive crossword puzzle game materials for the Indonesian learning program for Class IV SDN 009 Bina Baru Kampar: First, create educational materials in Microsoft Office, crossword, and PowerPoint, which will then be used to demonstrate the various educational materials used in the classroom. Then review the teaching materials based on validation by the media expert group and the material expert group so that a comparison can be made between the original and revised materials. The interactive crossword puzzle game learning media is considered feasible based on validation data collected from student response questionnaires, media experts, material experts, and practitioners. Based on media experts' assessments, the results are generally valid, with an eligibility rate of 95.0% in the 76-100% range.

In addition, the subject matter expert received 94.8% of the votes in the highly valid category. The teacher response questionnaire yielded an eligibility category score of 95.0%, which was considered very practical and within the possible range of 76-80%. Based on validation data from experts and users, digital-based crossword learning media demonstrates high feasibility and effectiveness for use in Indonesian subjects for Grade IV students at SDN 009 Bina Baru Kampar. Validation results from media experts show that the media design, user interface, and interactive features are appropriate, attractive, and suitable for the target age group. Content experts affirm that the material presented in the crossword puzzle is accurate, aligned with the curriculum, and supports the intended learning objectives. The quantitative score on the validation sheet shows that the medium achieved an average feasibility rating of 80% or higher, indicating it is highly feasible for classroom implementation.

Meanwhile, qualitative feedback from validators highlighted strengths such as the media's ability to stimulate students' interest and facilitate vocabulary retention through active learning. Previous research has shown that the development of digital learning media can enhance learning effectiveness in grade IV of elementary school. Research shows that using the PROGRES learning model and crossword media can improve fourth-grade students' cooperation and critical thinking skills (Ayuni, 2023). In addition, research found that digital-based crossword media can be an alternative to enhance learning effectiveness in grade IV of elementary school (Hermalini & Riglanti, 2024). The researchers analyzed these results and concluded that the combination of media between digital interactivity and game-based learning principles contributed significantly to its positive acceptance.

Additionally, the validation process revealed small suggestions for improvement, such as improving navigation clarity and adding more varied puzzle levels to accommodate different student abilities. This feedback is invaluable for further refinement. Overall, the validation data support the hypothesis that digital crossword media can be an effective and practical tool for enriching Indonesian learning for primary school students, promoting engagement, and improving learning outcomes. Based on the research results, it is clear that learning development needs to be applied in the classroom to make learning delivery more innovative and less boring. Learning development is a logical, methodical process for planning what will be used in the learning process, taking into account students' abilities and potential (Kholifah & Rahma, 2024). Learning development is carried out to make it easier for students to understand the subject matter. Media are usually understood as electronic, graphic, or photographic tools used to record, process, and reorganize verbal or visual information. To achieve specific learning objectives, media refers to the full utilization of all components of the learning system and the resources mentioned (Nurhasana, 2021).

CONCLUSION

Based on the results of the development and validation process, it can be concluded that the digital-based crossword learning media developed for Indonesian Class IV students at SDN 009 Bina Baru Kampar is feasible and effective as a learning tool. The media receives excellent evaluations from both subject matter

and media experts, which shows that the content is accurate, relevant, and well-designed. Feedback from teachers and students also showed positive responses, showing that the media was engaging, easy to use, and helped increase students' understanding and interest in learning Indonesian. Therefore, these digital crossword puzzles can serve as an innovative alternative and support traditional learning methods in primary education. Based on the results of this study, it is recommended that future research develop more interactive and engaging digital crossword media and integrate other technologies, such as augmented or virtual reality, to improve students' learning experience. In addition, further research can develop crossword media for other subjects and conduct comparative studies with other learning media to determine the relative effectiveness of each. Thus, future research can continue to increase the effectiveness of digital-based crossword media in Indonesian learning and other fields, as well as improve the quality of education in Indonesia.

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