STEAM Journal for Elementary School Education
Volume 2, Number 02, October 2026, Page 149-170
Website: https://journal.unesa.ac.id/index.php/sjese/index
E-ISSN 3109-6905

Development of a Digital Media Prototype: *Petualangan Aqua* Based on Short Stories for Water Cycle Learning among Elementary School Students

Andrearahman Damar Alivio,[1]*
Anisa Nur Sa'adah,[2]
Evi Febriana,[3]
Zuyyina Millaty Az-Zahro,[4]
Nur Wafiq Azizah,[5]
Hana Andriningrum,[6]
Vit Ardhyantama,[7]
Muhammad Imaduddin,[8]
Muh. Syauqi Malik,[9]

[1,2,3,4,5,6,7,8,9] Undergraduate Program of Elementary School Teacher Education, Campus 5, State University of Surabaya, Indonesia

*Correspondence author: 24111744011@mhs.unesa.ac.id

DOI: 10.26740/sjese.2.02.2026.4

Keywords:
digital learning media; digital storytelling; water cycle; elementary school science; literacy development; ADDIE model

Publisher:
Elementary School Education Program, Campus 5, Universitas Negeri Surabaya, Indonesia

Received: 5 June 2026,
Revised: 5 October 2026,
Accepted: 15 October 2026,
Published: 29 October 2026

Abstract

This study aimed to develop a short-story-based digital learning media prototype entitled *Petualangan Aqua* for teaching the water cycle to fifth-grade elementary school students. The development was motivated by the limited use of innovative learning media in science instruction, which often results in low student engagement and difficulties in understanding abstract scientific concepts. This study employed a Research and Development (R&D) approach using the ADDIE model, consisting of Analysis, Design, Development, Implementation, and Evaluation stages. However, the development process was limited to the expert validation stage. The prototype was developed using Canva and integrated water cycle content with short stories, interactive exercises, immediate feedback, and an educational game created using Scratch. The product was validated by two experts, including a university lecturer and an elementary school teacher, through media and material validation instruments. The results showed that the media expert validation achieved an average feasibility score of 93.75%, categorized as very valid, while the material expert validation obtained an average score of 95.00%, also categorized as very valid. These findings indicate that the developed media is highly feasible for supporting elementary school science learning. The integration of storytelling and interactive digital features provides meaningful learning experiences that support students' conceptual understanding and literacy development. This study contributes to the development of innovative digital learning media by demonstrating the potential of story-based approaches to enhance science learning and literacy simultaneously in elementary education.

INTRODUCTION

Twenty-first-century education requires learning processes that foster students' critical thinking, creativity, communication, collaboration, and digital literacy skills. At the elementary school level, learning should not only focus on conceptual mastery but also provide engaging, meaningful, and developmentally appropriate learning experiences. One subject that requires innovative instructional media is Science. Science learning at the elementary level often involves abstract concepts that are difficult for students to understand when delivered solely through verbal explanations or textbooks (Hardiansyah et al., 2023). In the topic of the water cycle, students are expected to understand natural processes that cannot be directly observed in everyday life, making the use of learning media essential for visualizing scientific concepts (Puriasih & Trisna, 2022a). Furthermore, learning experiences that integrate scientific concepts with meaningful contexts can help students understand the material more effectively (Hasani et al., 2021)

Science learning in elementary schools still faces various challenges. Teachers often rely on textbooks as the primary learning resource, resulting in teacher-centered instruction and limited student engagement. This condition contributes to low learning motivation and difficulties in understanding abstract scientific concepts. Yulistia et al., (2024) reported that students' low motivation in learning the water cycle topic is influenced by the limited use of technology in instruction and the dominance of textbooks as learning media. The lack of diverse instructional media has also been identified as one of the factors that hinders students' understanding of science concepts (Septiani et al., 2023).

The rapid development of digital technology provides opportunities to create more interactive learning media that align with the characteristics of elementary school students. Author et al., (2023) stated that digital learning media can improve students' understanding of the water cycle while simultaneously supporting the development of digital literacy skills. Similarly, Nurseptyani & Saptono, (2023) found that digital picture storybooks effectively improve science learning outcomes because they connect scientific concepts with engaging learning experiences. Fauziah et al., (2025) further explained that contextual digital media can create more active and meaningful learning experiences for students.

One form of digital media with considerable potential is story-based media or storytelling. Stories can connect information with emotional experiences, making it easier for students to understand and remember learning materials. Musyaffa et al., (2023) demonstrated that digital storytelling media can increase students' reading interest and engagement during the learning process. Candrayani & Sujana, (2023) explained that contextual digital storytelling media supports the development of students' basic literacy skills through meaningful learning experiences. Londoño-

Proaño & Pérez-Gavilanes, (2026) emphasized that digital narratives can enhance students' motivation in science learning.

In the context of science education, integrating stories with digital media enables students to understand natural phenomena through narratives that are closely related to their daily lives. Yonanda et al., n.d.-a explained that integrating scientific concepts into language learning can help students understand content more contextually. Moreover, the use of stories in learning can improve elementary school students' reading literacy skills (Yulistia et al., 2024). The use of digital storybooks has also been shown to help students understand scientific information in a more accessible and engaging manner (Nurseptyani & Saptono, 2023).

Although previous studies have developed various digital learning media for science education, including animated videos, digital books, and other visual-based media, further exploration is needed into the integration of narrative and interactive features for teaching the water cycle in elementary schools. Previous studies have addressed the development of digital media for science learning Puriasih & Trisna, (2022). Wulandari et al., (2023) and the use of technology-based media to support students' motivation in learning the water cycle. Yulistia et al., (2024) However, the extent to which short story-based media can integrate branching story choices, quizzes, and learning challenges into a unified learning experience requires further investigation. To address this opportunity, the present study develops *Petualangan Aqua*, a digital short-story-based learning media prototype that combines narrative-based content with interactive features to support the learning of water cycle concepts in elementary schools.

Based on the identified research gap, this study aims to develop a prototype of *Petualangan Aqua*, an interactive digital short-story-based learning medium for teaching the water cycle in elementary schools, and to evaluate its feasibility through media expert and subject-matter expert validation. The prototype incorporates branching story choices, quizzes, and learning challenges to provide an interactive learning experience. The findings are expected to inform the design of narrative-based digital media for elementary science education and provide a foundation for subsequent studies examining its practicality and effectiveness.

METHODS

This study employed a Research and Development (R&D) approach to develop a digital media prototype entitled *Petualangan Aqua*, a short story-based learning medium designed to facilitate water cycle learning among elementary school students. The R&D method was selected because it enables researchers to systematically design, develop, and validate educational products before their implementation in learning activities (Made & Parwati, n.d.). The development process adopted the ADDIE model, which consists of five sequential stages: Analysis,

Design, Development, Implementation, and Evaluation. This model was chosen because it provides a structured framework for developing instructional media and has been widely utilized in educational product development (Puriasih & Trisna, 2022).

The ADDIE model offers several advantages in educational media development. It provides systematic procedures that facilitate the development process from identifying learning needs to evaluating the final product. Furthermore, the model allows continuous revision and improvement based on feedback obtained throughout the development process (Saadah & Hasanah, 2023). Despite these advantages, the ADDIE model requires considerable time and effort because each stage must be completed systematically before proceeding to the next stage. Therefore, careful planning is necessary to ensure the effectiveness of the development process.

Percentage Range	Validity Category
81% - 100%	Very Valid
61% - 80%	Valid
41% - 60%	Moderately Valid
21% - 40%	Less Valid
0% - 20%	Invalid

The percentage scores obtained from the expert validation sheets were interpreted using predetermined validity criteria, as presented in Table X. These criteria were used to classify the feasibility of the developed media based on the percentage achieved. The same criteria were applied to the assessments provided by both validators. The resulting categories were then used to describe the level of media feasibility before further development and potential implementation in elementary school learning activities.

ADDIE Development Stages

The development of the *Petualangan Aqua* prototype followed the five stages of the ADDIE model.

1. Analysis

The analysis stage was conducted to identify students' learning needs, learner characteristics, and difficulties encountered in understanding the water cycle concept. Literature reviews and curriculum analyses were carried out to determine the content and learning objectives to be incorporated into the media. This stage also examined the need for digital learning media capable of increasing

students' motivation and conceptual understanding of science topics (Yonanda et al., n.d.-b)

2. Design

The design stage involved preparing the initial blueprint of the prototype. Activities included developing storylines, creating storyboards, organizing water cycle content, selecting illustrations and characters, and designing the user interface. The integration of storytelling elements was intended to create meaningful learning experiences and increase students' engagement during learning activities (Permatasari & Widagdo, 2025).

3. Development

The development stage focused on transforming the design into a functional digital media prototype. At this stage, the *Petualangan Aqua* prototype was developed by integrating water cycle concepts with interactive storytelling and visual illustrations. The development process was inspired by previous studies that demonstrated the effectiveness of digital learning media in supporting elementary students' science learning outcomes (Septiani1 et al., 2023).

4. Implementation

The implementation stage of the ADDIE model generally involves introducing the developed product to its intended users in a learning setting. However, this study did not conduct classroom implementation or student trials. The research was limited to prototype development and expert validation. Therefore, the implementation stage was not carried out as a field-testing procedure, and the prototype was prepared for potential implementation in subsequent research. (Swarmahardika & Widiana, 2024).

5. Evaluation

Evaluation was conducted formatively through expert validation and the analysis of validators' feedback. Quantitative scores were used to assess the prototype's feasibility, while qualitative comments and suggestions were examined to identify aspects requiring revision. The evaluation findings informed improvements to the prototype before it could proceed to classroom implementation and further testing (Winangun, 2024).

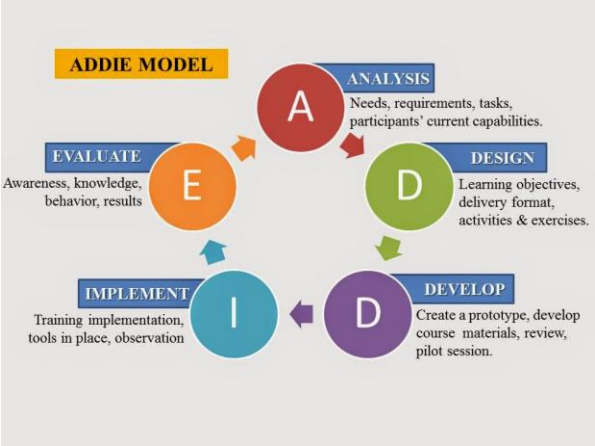


Figure 1. ADDIE Development Model

The prototype was evaluated by two validators: one university lecturer and one elementary school teacher. The validators were selected to provide academic and classroom-practice perspectives on the developed media. The lecturer and teacher reviewed the prototype based on their respective areas of competence and the validation criteria provided in the assessment sheets. Given the limited number of validators, the results were interpreted as a preliminary assessment of prototype feasibility rather than evidence of broad consensus among experts. (Made & Parwati, n.d.)

The research instruments consisted of a subject-matter validation sheet and a media validation sheet. The subject-matter validation sheet assessed the accuracy and relevance of the water cycle content, curriculum alignment, language appropriateness, and suitability for elementary school students. The media validation sheet assessed visual presentation, readability, navigation, interactivity, and usability-related features. The items were organized according to the assessment aspects specified in each sheet. The completed instruments were used to collect quantitative ratings and qualitative feedback from the validators. (Musyaffa et al., 2023)

Data analysis employed a mixed-methods approach, combining qualitative and quantitative techniques. Qualitative data were obtained from validators' comments and suggestions and analyzed descriptively to identify aspects requiring improvement. Quantitative data were obtained from validation scores and analyzed using descriptive statistics in the form of mean scores and feasibility percentages. The use of mixed methods enabled a more comprehensive evaluation of the prototype by integrating numerical results with expert feedback (Veriska & Prasetyaningtyas, 2025)

Since this study was limited to the expert validation stage, the validation results were used to determine whether the *Petualangan Aqua* prototype was sufficiently feasible to proceed to future field-testing stages. Therefore, expert

validation served as the primary indicator of product quality and readiness for subsequent development (Puriasih & Trisna, 2022b)

RESULTS AND DISCUSSION

This study produced a digital media prototype called *Petualangan Aqua*, which was developed to support water cycle learning for fifth-grade elementary school students. The media was developed using a modified ADDIE model up to the expert validation stage. The resulting product is a short story-based digital learning media that integrates Science and Indonesian Language subjects into a single learning experience. This integration was intended to help students understand water cycle concepts through contextual reading activities while simultaneously supporting literacy development.

Petualangan Aqua was developed using the Canva platform by incorporating various visual elements, including illustrations, text, interactive buttons, and learning activities designed according to the characteristics of elementary school students. In addition to presenting water cycle content, the media also includes interactive exercises, short stories, and an educational game developed using Scratch to enhance student engagement during the learning process.

The development results are presented through several main displays, including the opening page, learning objectives page, main menu, story character selection page, short story content, water cycle material page, practice exercises, answer feedback pages, and an educational game. Each display was designed to support the achievement of learning objectives while providing a more engaging and meaningful learning experience for students.

1. Development Results of the *Petualangan Aqua* Digital Media Prototype

This section presents the development results of the *Petualangan Aqua* digital media prototype, which consists of several main displays. Each display is described to illustrate its characteristics, functions, and roles in supporting water cycle learning at the elementary school level.



Figure 2. Opening page

As shown in Figure 2, the opening page is the first display that appears when users access the *Petualangan Aqua* digital media. It presents the media title, illustrations related to the water cycle learning topic, and a play button that allows users to begin exploring the learning content. The visual design introduces the learning theme and provides a clear starting point for navigation. The page was designed using an attractive color combination and visual elements appropriate for elementary school students, creating a positive first impression of the learning experience.

The opening page was designed to capture students' attention while providing an overview of the learning content. The use of visual elements that are directly related to the water cycle topic reflects the application of the *coherence principle*, in which only relevant information is presented to support learning objectives. In addition, the presence of clear navigation buttons demonstrates the implementation of the *signaling principle*, helping users understand how to begin interacting with the media.



Figure 3. Learning objectives page

The learning objectives page is presented after the opening page and serves to inform students about the competencies they are expected to achieve after using the *Petualangan Aqua* media. The objectives are developed based on the fifth-grade water cycle topic and are presented in simple language to ensure that students can easily understand them.

The inclusion of learning objectives at the beginning of the media is intended to help students understand the direction and focus of the learning activities. This feature reflects the application of the *signaling principle* by providing clear guidance regarding the learning outcomes that should be achieved. Furthermore, placing the objectives before the main learning content demonstrates the *segmenting principle*, as information is presented gradually to prepare students before engaging with more complex material.



Figure 4. Main menu page

The main menu page serves as the central navigation interface of the *Petualangan Aqua* digital media. As shown in Figure 4, the page provides three main options: *Cerita* (Story), *Game* (Game), and *Soal* (Quiz). These options allow students to access the story-based learning activities, educational games, and assessment questions available in the media.

The main menu was designed by considering usability and the characteristics of elementary school students. The use of icons, illustrations, and clearly labeled buttons helps students identify the function of each menu and navigate the media independently. This feature reflects the implementation of the *signaling principle*, which emphasizes the use of visual cues to guide users toward important information and navigation pathways.

Furthermore, organizing the learning components into separate menus demonstrates the application of the *segmenting principle*. The learning materials, stories, exercises, and games are presented in distinct sections, enabling students to explore each component gradually rather than being exposed to excessive information at once. Such an arrangement is expected to reduce cognitive load and support a more effective learning experience.



Figure 5. Story Character Selection Page

The story character selection page is one of the main features of the *Petualangan Aqua* media. On this page, students are given the opportunity to choose a character who will guide them through a short story integrated with the water

cycle material. Each character is presented through engaging illustrations designed to stimulate students' curiosity and encourage them to continue the learning activities.

The character selection feature was designed to provide an interactive learning experience. Through this feature, students can select a character before proceeding to the story, allowing them to engage with the learning media through a simple form of interaction. The visual representation of the characters also helps introduce the story context and makes the media more visually appealing to elementary school students.

From an instructional design perspective, this feature supports student interaction with the digital learning media. In addition, the combination of character illustrations and accompanying text reflects the *multimedia principle*, which emphasizes the use of words and relevant pictures to support learning. The visual elements are intended to help students connect the story presentation with the learning content about the water cycle.



Figure 6. Short Story Page

The short story page serves as the core component of the *Petualangan Aqua* media, integrating Indonesian Language and Science learning. On this page, students read a short story that incorporates water cycle concepts through contextual narratives and characters that are closely related to their daily experiences. Presenting learning content through storytelling is intended to help students understand scientific concepts while simultaneously developing their reading comprehension skills.

The use of short stories provides students with opportunities to learn water cycle concepts in a meaningful context. Rather than presenting information solely through conceptual explanations, the content is embedded within a narrative that helps students connect events in the story to the scientific concepts being studied. Through a structured storyline, students can explore the water cycle concepts presented in the learning material.

From a multimedia learning perspective, the use of illustrations alongside the written narrative reflects the *multimedia principle*, which emphasizes the integration of words and relevant pictures to support learning. The story also reflects the *coherence principle*, as the narrative content and visual elements are designed to remain relevant to the learning objectives concerning the water cycle. These features are intended to help students relate the storyline to the scientific concepts presented in the media.



Figure 7. Water Cycle Material Page

The water cycle material page presents the main concepts that serve as the focus of learning within the *Petualangan Aqua* media. The content is organized systematically by explaining the stages of the water cycle, including evaporation, condensation, precipitation, and infiltration. The presentation is supported by relevant illustrations that help students understand the water cycle processes in a more concrete and accessible manner.

The water cycle material is presented after students read the short story provided in the previous section. This sequence is intended to help students connect their reading experiences with the scientific concepts being studied. As a result, students acquire knowledge not only through direct explanations but also through the context established within the story.

From a multimedia learning perspective, this display reflects the application of the *multimedia principle* through the integration of text and illustrations to explain water cycle concepts. The use of visuals that directly support the content helps students establish connections between visual representations and scientific information. Furthermore, the presentation focuses only on essential concepts related to the water cycle, demonstrating the application of the *coherence principle*, as all information remains relevant to the learning objectives and avoids unnecessary distractions.



Figure 8. Practice Exercise Page

The practice exercise page is provided to assess students' understanding of the water cycle concepts that have been presented in the previous sections. The questions are designed based on the content contained in both the short story and the instructional material, allowing students to apply the knowledge they have acquired throughout the learning process. Presenting exercises within the media encourages students to participate actively in learning activities.

In addition to functioning as an assessment tool, the exercises help students reflect on their level of understanding of the water cycle concepts. Through this activity, students can identify concepts they have mastered as well as areas that require further reinforcement. Therefore, the exercises serve not only as an evaluation instrument but also as a means of strengthening the learning process.

From an instructional design perspective, placing the exercises after the story and content sections reflects the application of the *segmenting principle*. Students are given opportunities to learn the information before demonstrating their understanding through assessment activities. This gradual learning sequence is expected to support the development of a more structured conceptual understanding.



Figure 9. Correct Answer Feedback



Figure 10. Incorrect Answer Feedback

The answer feedback pages are displayed after students complete the practice exercises provided within the media. Feedback is presented in two forms: feedback for correct answers and feedback for incorrect answers. In Figure 9, the media displays an appreciation message when students successfully select the correct answer. This message serves as positive reinforcement to enhance students' motivation and confidence during the learning process. Meanwhile, in Figure 10, the media informs students that their answer is incorrect and encourages them to try again until they find the correct response.

The provision of immediate feedback is intended to help students recognize the outcomes of their responses without waiting for teacher evaluation. Through this mechanism, students can immediately identify and correct their mistakes, allowing the learning process to continue effectively. Furthermore, positive feedback for correct answers can enhance students' motivation while interacting with the media

From an instructional design perspective, the feedback feature demonstrates that the media functions not only as a content delivery tool but also as a learning support system that facilitates evaluation and reflection. Presenting different responses for each answer choice creates two-way interaction between users and the media, making the learning experience more active and meaningful.

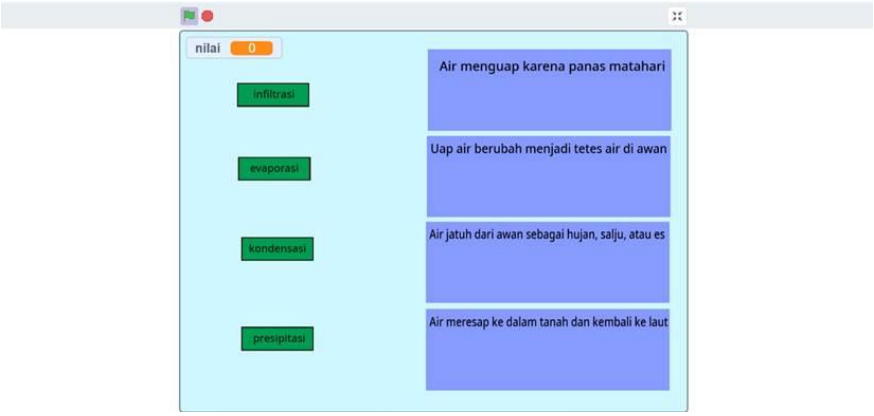


Figure 11. Educational Game Page

Figure 11 presents an educational game developed using Scratch as a reinforcement activity after students study the water cycle material and complete the practice exercises. The game applies a *drag-and-drop* mechanism in which students are required to match answers with the appropriate positions. If an incorrect answer is selected, students are encouraged to try again until they identify the correct response. The inclusion of this educational game in the *Petualangan Aqua* media aims to increase student engagement while strengthening conceptual understanding through a more interactive and enjoyable learning experience. From a multimedia learning perspective, this feature reflects the application of the *multimedia principle* by integrating visual elements and interactive activities that support the learning process.

Referring to Mayer, (2009) multimedia theory, this section will discuss in depth whether the *Petualangan Aqu*a media's presentation aligns with the principles of effective learning. This analysis is crucial to determine whether the combination of short stories, images, and interactive buttons in the media is appropriate for elementary school students. This is done to enable students to understand the complex and abstract material of the water cycle more easily without confusing or tiring them while learning. An examination of the four principles will be outlined in this discussion.

1. Coherence Principle: The application of the coherence principle in the Aqua Adventure media is demonstrated through the selection of visual elements relevant to the water cycle theme on the home page (Fig. 1), story page (Fig. 5), and material page (Fig. 6). Limiting additional decorations or animations is done with the psychological aim of helping students focus on the essence of the material. In accordance with multimedia learning theory, minimizing irrelevant information or visual distractions is crucial for maintaining children's cognitive comfort (Mayer, 2009). The application of the coherence principle in digital multimedia has also been shown to help students focus their attention on relevant information during the learning process (Rahayu et al., n.d.)
2. Signaling Principle: The signaling principle is realized through explicit navigation cues, such as the home button (Fig 1), milestones (Fig 2), and the wooden board icon on the main menu (Fig 3). These contrasting visual cues help students learn media features independently. Well-structured signaling helps students understand how to navigate the media and reduces navigation errors (Mayer, 2009)
3. Segmenting Principle: The segmentation principle is applied by dividing the learning components into several separate pages, starting from the objectives (Fig. 2), menu (Fig. 3), short stories (Fig. 5), materials (Fig. 6),

to practice questions (Fig. 7). This gradual arrangement ensures that students' learning rhythm is not received in a pile-up. By dividing the material into small parts, students' clicking speed can help prevent cognitive overload (Prasandha et al., 2025)

4. Multimedia Principle: This principle is applied through a combination of short story text (Fig. 5), water cycle visualization (Fig. 6), and scratch-based educational games (Fig. 10). This combination of words and images works because it helps students build mental connections between abstract scientific phenomena and the concrete representations displayed on the screen. Theoretically, students can learn better by combining illustrations and text than by reading text alone (Mayer, 2009). The application of multimedia principles to learning media has also been shown to increase the effectiveness of the learning process because it helps students understand the material more easily and interestingly (Fatwa Ma'arij et al., n.d.)

2. Media Expert Validation Results

Media expert validation was conducted by two validators consisting of a lecturer from the Primary School Teacher Education Study Program, State University of Surabaya, namely Ika Febriana Wati M.Pd., and a fifth-grade teacher at SDN Gerih 3, namely Lismiatun, S.Pd. The validation aimed to determine the feasibility of the developed digital learning media before its implementation in learning activities. The media validation instrument consisted of 20 assessment items covering media suitability, student engagement, usability, efficiency, and media quality. The assessment employed a four-point Likert scale, where a score of 4 represented *very appropriate*, a score of 3 represented *appropriate*, a score of 2 represented *less appropriate*, and a score of 1 represented *not appropriate*. The results of the media expert validation are presented in Table 1.

Table 1. Results of Media Expert Validation

No	Validator	Percentage (%)	Category
1	Lecturer Validator (Ika Febriana Wati, M.Pd.)	95.00	Very Valid
2	Teacher Validator (Lismiatun, S.Pd.)	92.50	Very Valid
	Average	93.75	Very Valid

Based on the media validation conducted by two validators, namely Ika Febriana Wati, M.Pd. and Lismiatun, S.Pd., the average feasibility percentage reached 93.75%, which falls into the very valid category. These findings indicate that

the *Petualangan Aqua* digital media is feasible to be used as a supporting learning medium for water cycle instruction in elementary schools. The validators considered that the media was aligned with the learning objectives and students' characteristics while also having the potential to increase students' motivation and engagement during the learning process. Furthermore, the use of illustrations, interactive buttons, practice exercises, and educational games was considered effective in supporting students' conceptual understanding in a more engaging and meaningful manner.

Although the media achieved a very valid category, the validators provided several suggestions for improvement, including correcting typographical errors and adding explanations to the water cycle illustrations to make the presented information more comprehensive. These recommendations were used as the basis for revising and refining the media before proceeding to the next stage of development. This finding is consistent with the study of Aprilia, (2024), which reported that highly valid interactive learning media have the potential to improve learning quality through more engaging and comprehensible content presentation. The results also support the findings of Amelia & Astuti, (2025), who concluded that Canva-based digital learning media designed according to students' characteristics can serve as an effective and feasible instructional medium.

3. Material Expert Validation Results

Material expert validation was conducted by two validators consisting of a lecturer from the Primary School Teacher Education Study Program, State University of Surabaya, namely Ika Febriana Wati, M.Pd., and a fifth-grade teacher at SDN Gerih 3, namely Lismiatun, S.Pd. The validation aimed to determine the feasibility of the content and learning materials developed before being implemented in learning activities. The material validation instrument consists of 20 assessment items that include curriculum suitability, accuracy of scientific concepts, clarity of instructional language, and integration of short stories into learning content. The assessment uses a four-point Likert scale, where a score of 4 represents *very appropriate*, a score of 3 *represents appropriate*, a score of 2 represents *less appropriate*, and a score of 1 *represents inappropriate*. The results of the validation of the material expert are presented in Table 2.

Table 2. Results of Material Expert Validation

No	Validator	Percentage (%)	Category
1	Lecturer Validator (Ika Febriana Wati, M.Pd.)	93.75	Very Valid
2	Teacher Validator (Lismiatun, S.Pd.)	96.25	Very Valid

Average	95.00	Very Valid

Based on the material validation conducted by two validators, namely Lismiatun, S.Pd. and Ika Febriana Wati, M.Pd., the average feasibility percentage reached 95.00%, which falls into the very valid category. These findings indicate that the learning content integrated into the *Petualangan Aqua* digital learning media is highly feasible for use in elementary school science learning. The validators considered that the developed material was aligned with the curriculum, scientifically accurate, and presented using clear instructional language that was appropriate for elementary school students. In addition, the integration of short stories within the learning content was considered effective in supporting students' understanding of the water cycle concept in a more meaningful and engaging manner.

Although the material achieved a very valid category, the validators provided several suggestions for improvement, which were used as the basis for revising and refining the content before proceeding to the next stage of the research. The high validity of the material indicates that the developed content has met the requirements for effective learning resources and has the potential to support students in constructing accurate conceptual understanding while minimizing misconceptions. This finding is in line with the study conducted by Kadek et al., (2021), which reported that interactive multimedia designed with appropriate content, systematic presentation, and consideration of learners' needs is highly feasible for use in science learning and can support students' independent understanding of concepts. The results also support the findings of Pratiwi et al., (2023), who emphasized that well-structured learning materials that are free from misconceptions play an important role in fostering students' conceptual understanding throughout the learning process.

4. Discussion

The results of media and material validation indicate that the *Petualangan Aqua* digital media prototype has a very high level of feasibility for supporting water cycle learning in elementary schools. The high validity scores suggest that the developed media successfully fulfilled the criteria related to content suitability, media design, student characteristics, and learning objectives. The integration of science content with short stories represents one of the major strengths of the media because it enables students to learn scientific concepts through meaningful and contextual narratives. This finding is consistent with the study of Lestyani et al., (2024), which reported that story-based learning can enhance student engagement, learning activities, and conceptual understanding.

The positive validation results are also associated with the application of multimedia learning principles throughout the development process. The *Petualangan Aqua* media applies the *multimedia principle* by combining text, illustrations, and interactive activities to support knowledge construction. In addition, the *signaling principle* is reflected through the use of navigation buttons, instructions, and highlighted information that direct students' attention to essential concepts. The presentation of content in structured sections demonstrates the application of the *segmenting principle*, allowing students to process information gradually according to their cognitive capacity. (Rahayu et al., n.d.) reported that the implementation of Mayer's multimedia principles in digital learning media contributes to more organized and comprehensible learning experiences for elementary school students.

The interactive features embedded in the media also contribute to its feasibility. Practice exercises, immediate feedback, and Scratch-based educational games provide opportunities for active student participation during learning activities. These features function not only as assessment tools but also as reinforcement activities that strengthen previously learned concepts. This finding is supported by Warda et al., (2025), who concluded that Canva-assisted interactive multimedia can improve science learning quality through engaging visual presentations and learner-centered activities.

Furthermore, the short-story-based design adopted in this study supports the development of students' literacy skills. Integrating reading activities with science content allows students to develop literacy competencies and conceptual understanding simultaneously. This result is in line with the findings of Jati & Purwati, (2024), who reported that story-based digital multimedia can improve reading comprehension while increasing student engagement in learning activities. Therefore, the *Petualangan Aqua* digital media prototype has the potential to serve as an alternative instructional medium that supports both science learning and literacy development in elementary schools.

CONCLUSION

The development of the *Petualangan Aqua* digital media prototype based on short stories for water cycle learning successfully produced a learning medium that is highly feasible for use in elementary school science instruction. The results of media expert validation obtained an average feasibility score of 93.75%, categorized as very valid, while the material expert validation achieved an average score of 95.00%, also categorized as very valid. These findings indicate that the developed media has met the criteria of feasibility in terms of content quality, instructional design, visual appearance, interactivity, usability, and suitability for elementary school students' characteristics.

The integration of water cycle concepts with short stories, visual illustrations, interactive exercises, immediate feedback, and educational games enables students to experience a more meaningful and engaging learning process. Furthermore, the media has the potential to support not only students' understanding of scientific concepts but also the development of literacy skills through contextual and story-based learning experiences. Therefore, *Petualangan Aqua* can serve as an innovative alternative for elementary science learning that aligns with the demands of twenty-first-century education and the advancement of digital technology. Future research is recommended to conduct field testing to examine the effectiveness of the media in improving students' learning outcomes, learning motivation, and literacy skills.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

REFERENCES

Amelia, F. H., & Astuti, T. (2025). MIRA (Introducing Community Identity): Interactive Learning Media Based on Canva for Fourth Grade Elementary School Students. *International Journal of Elementary Education*, *9*(1), 179–188. https://doi.org/10.23887/ijee.v1i1.89762

Aprilia, T. (2024). Utilization of interactive e-flipbook media oriented toward contextual approaches to learning in elementary schools. *Jurnal Inovasi Teknologi Pendidikan*, *11*(2), 184–204. https://doi.org/10.21831/jitp.v11i2.71434

Author, C., Siska Wulandari, K., Putu Parmiti, D., & Made Citra Wibawa, I. (2023). Audio-Visual Learning Media Based on Digital Literacy on the Topic of the Water Cycle. *Journal of Education Technology*, *7*(3), 504–512. https://doi.org/10.23887/jet.v7i3

Fatwa Ma'arij, M., Rahman Patta, A., & Putra, K. P. (n.d.). Efektifitas Pembelajaran Berbasis Multimedia Interaktif Dengan Prinsip Mayer Terhadap Hasil Belajar Menggunakan Aplikasi Autoplay Media Studio. *Journal of Computers*, (1). Retrieved https://journal.unm.ac.id/index.php/CIVE/

Fauziah, M., Perwitasari, N., Rigianti, H. A., Dzulkurnain, M. I., & Ikhsan, W. A. (2025). Bridging pedagogy and technology: Developing contextual digital story media to support foundational literacy. *Edelweiss Applied Science and Technology*, *9*(8), 898–912. https://doi.org/10.55214/2576-8484.v9i8.9473

Hardiansyah, F., Zainuddin, Z., Sukitman, T., & Astutik, C. (2023). DEVELOPMENT OF LEARNING MEDIA SMART BOOK TO IMPROVE UNDERSTANDING OF ELEMENTARY SCHOOL STUDENTS IN SCIENCE LEARNING. *Lentera*

Pendidikan : Jurnal Ilmu Tarbiyah Dan Keguruan, *26*(1), 72–87. https://doi.org/10.24252/lp.2023v26n1i7

Hasani, A., Juansah, D. E., Sari, I. J., & El Islami, R. A. Z. (2021). Conceptual frameworks on how to teach stem concepts in bahasa indonesia subject as integrated learning in grades 1–3 at elementary school in the curriculum 2013 to contribute to sustainability education. *Sustainability (Switzerland)*, *13*(1), 1–15. https://doi.org/10.3390/su13010173

Jati, A. R., & Purwati, P. D. (2024). Development of Multimedia Based E-Folklore to Improve Reading Comprehension of Grade IV Elementary School. *Jurnal Prima Edukasia*, *12*(2), 325–332. https://doi.org/10.21831/jpe.v12i2.75433

Kadek, I., Nata, W., & Semara Putra, N. (2021). *Media Pembelajaran Multimedia Interaktif pada Muatan IPA Kelas V Sekolah Dasar*. *5*(2). https://doi.org/10.23887/jipp.v5i2

Lestyani, K. A., Riandy Agusta, A., Dhania, H., Guru, P., & Dasar, S. (2024). Short story learning model and its role in improving motivation, activity, critical thinking, and learning outcomes of elementary school students. In *Cendikia : Media Jurnal Ilmiah Pendidikan* (Vol. 14, Number 5).

Londoño-Proaño, C., & Pérez-Gavilanes, V. (2026). Digital science fiction as a narrative mediator for STEM motivation in elementary education: a mixed-methods study. *Frontiers in Education*, *10*. https://doi.org/10.3389/feduc.2025.1720987

Made, N., & Parwati, L. (n.d.). *Peran Generasi Muda dalam Pelestarian Seni untuk Mewujudkan Indonesia Emas 2045*.

Mayer, R. E. (2009). *Multimedia Learning* (2nd ed.).

Musyaffa, A. A., Asiah, S., Rapiko, Fadhil, M., & Ubaidah, S. (2023). Digital Tales Media to Improve Reading Literacy for II Grade Elementary School Students. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *7*(1), 906–101. https://doi.org/10.23887/jppp.v7i1.59886

Nurseptyani, R., & Saptono, S. (2023). The Effectiveness of Development Digital Picture Story Books to Improve Science Learning Outcomes on 5th Grade Elementary School Students. *International Journal of Research and Review*, *10*(2), 141–148. https://doi.org/10.52403/ijrr.20230219

Permatasari, S., & Widagdo, A. (2025). Development of Canva-Based E-book Story Learning (E-Boci) to Improve Indonesian Language Learning Outcomes in Elementary School. *KEMBARA Journal of Scientific Language Literature and Teaching*, *11*(1), 487–504. https://doi.org/10.22219/kembara.v11i1.33869

Prasandha, D., Ahmad Fashiha Hastawan, Firstya Evi Dianastiti, & Dilla Puspitasari. (2025). Prinsip Pengembangan Media Berdiferensi berbasis TPACK sebagai

Aksentuasi Keterampilan Berbahasa Produktif. *Indonesian Journal of Education and Learning*, *8*(1), 94–103. https://doi.org/10.31002/ijel.v8i1.2379

Pratiwi, I., Hafipa, S., Rahmah, R. F., Putri, D., Pulungan, Y., Muhammadiyah, U., Utara, S., & Ac, I. I. (2023). Analisis Konsepsi Awal Siswa Kelas V Pada Materi Siklus Air Di SDT Muhammadiyah 36 Medan Denai. *EJI | Educati on Journal of Indonesia*, *4*, 28–32. https://publication.umsu.ac.id/index.php/eji

Puriasih, K. N., & Trisna, G. A. P. S. (2022a). Digital Comics Learning Media Based on Problem Based Learning in Science Subjects for Fourth Grade Elementary School. *MIMBAR PGSD Undiksha*, *10*(2), 367–375. https://doi.org/10.23887/jjpgsd.v10i2.48575

Puriasih, K. N., & Trisna, G. A. P. S. (2022b). Digital Comics Learning Media Based on Problem Based Learning in Science Subjects for Fourth Grade Elementary School. *MIMBAR PGSD Undiksha*, *10*(2), 367–375. https://doi.org/10.23887/jjpgsd.v10i2.48575

Rahayu, P., Budiharto, T., Guru, P., & Dasar, S. (n.d.). *Analisis penerapan prinsip Mayer pada multimedia digital dalam pembelajaran matematika di kelas iv sekolah dasar*.

Saadah, F. N. L., & Hasanah, F. N. (2023). Development of Science Learning Media Klanimal Android-Based for Elementary School Students. *Edunesia: Jurnal Ilmiah Pendidikan*, *4*(3), 1222–1240. https://doi.org/10.51276/edu.v4i3.534

Septiani[1], W., Hendrawan[2], B., & Permana[3], R. (2023). Development of Android-Based Sikair Interactive Learning Media to Improve Learning Outcomes of Class V Elementary School Students on the Material of the Water Cycle. *JETISH: Journal of Education Technology Information Social Sciences and Health E-ISSN*, *2*(2).

Swarmahardika, I. K. P., & Widiana, I. W. (2024). Interactive Learning Media Based on Augmented Reality to Improve Elementary School Grade V Students' Understanding of the Water Cycle Concept. *MIMBAR PGSD Undiksha*, *12*(2), 351–359. https://doi.org/10.23887/jjpgsd.v12i2.74930

Veriska, V. Y., & Prasetyaningtyas, F. D. (2025). Development of Mini Cinema Digital Media in Science Learning on the Material of my Region, my Pride in Class V of Kerokan Elementary School. *Jurnal Penelitian Pendidikan IPA*, *11*(2), 259–267. https://doi.org/10.29303/jppipa.v11i2.10369

Warda, W., Susanti, R., & Susanti, L. R. R. (2025). Systematic Literature Review of the Effectiveness of Canva-Assisted Interactive Multimedia in Elementary Science Education. *Journal of Innovation and Research in Primary Education*, *4*(3), 1020–1033. https://doi.org/10.56916/jirpe.v4i3.1758

Winangun, I. M. A. (2024). Tri Pramana-Based Digital Learning Media: Enhancing Students' Science Learning Outcomes in Elementary Schools. *Journal for Lesson and Learning Studies*, *7*(3), 524–532. https://doi.org/10.23887/jlls.v7i3.91408

Yonanda, D. A., Islahudin, I., Ramadhani, F. A., Febriyanto, B., Saputra, D. S., Yuliati, Y., & Nurhidayat, E. (n.d.-a). *Improving Motivation and Learning Outcomes of Elementary School Students with Multimedia-Based Interactive Media*. https://doi.org/10.23917/ppd.11i3.5761

Yonanda, D. A., Islahudin, I., Ramadhani, F. A., Febriyanto, B., Saputra, D. S., Yuliati, Y., & Nurhidayat, E. (n.d.-b). *Improving Motivation and Learning Outcomes of Elementary School Students with Multimedia-Based Interactive Media*. https://doi.org/10.23917/ppd.11i3.5761

Yulistia, A., Anindya, A., Islamiati, A., Hani, iswati, Nadia Alwini, S., & Nuryadin, A. (2024). *DEVELOPING ANIMATED VIDEO FOR WATER CYCLE TOPIC IN FIFTH GRADE OF ELEMENTARY SCHOOL*. *13*(1).