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PHOTAR: Articulate Storyline-Based Learning Media to Improve Elementary Students' Interest in Learning Photosynthesis

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ABSTRACT

Students' learning interest in elementary schools is an essential aspect of education; however, low levels of interest often cause students to become passive during the learning process. This study aims to identify the factors contributing to low learning interest and to enhance it through the development of Photar media based on Articulate Storyline. The method used is Research and Development (R&D) with the ADDIE model, which consists of the stages of analysis, design, development, implementation, and evaluation. In the analysis stage, a needs analysis was conducted through questionnaires and interviews involving 25 fourth-grade students at SDN Mampang Prapatan 01 Pagi to measure learning interest. The results showed that 94% of students needed the use of learning media, which was influenced by the dominance of lecture-based teaching methods. The research instruments included a pre-learning interest questionnaire, expert validation sheets, and student response questionnaires. The indicators of learning interest measured were attention, interest, engagement, and enjoyment. The development stage produced media validated by media experts (87%), material experts (88%), and language experts (86%). In the implementation stage, 93% of students expressed satisfaction with the learning media used. This study contributes to the advancement of interactive Photar learning media aimed at enhancing students' interest in learning. The implementation of Photar media at SDN Mampang Prapatan 01 Pagi serves as an innovative approach in the instructional process, as it effectively fosters students' learning interest by providing media that corresponds to their needs and preferences.

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1. INTRODUCTION

The learning media currently used is still not effective in capturing students' attention, as it tends to be less creative and make limited use of technology. Meanwhile, elementary school students are generally more interested in learning that is engaging, colorful, and interactive. This indicates a gap between the existing media and students' needs. As a result, students become less active, easily bored, and show lower interest in understanding the material. Therefore, more engaging and interactive Photar-based media is needed to enhance students' interest in learning. The advancement of the digital era has profoundly transformed many aspects of human life, including education. In the field of education, digital learning has been utilized as an alternative

that makes learning materials easily accessible (Luthfi et al., 2023; Purba & Saragih, 2023). Studying science in a technology-supported environment with visual aids has been proven to be more effective than learning in conventional classroom settings (Peña-Ayala, 2021). The use of technology-based learning in elementary schools has not yet been implemented evenly. This situation is caused by limited access to schools located in residential areas and the lack of teacher training in utilizing digital learning media. Consequently, many schools, including SDN Mampang Prapatan 01 Pagi, continue to depend on lecture-based teaching methods as they are considered more practical and time-efficient in delivering learning content. Even though teachers provide clear explanations, students may still find it difficult to fully grasp certain concepts, particularly those that are abstract. This indicates that the learning process is still dominated by teacher-centered instruction, which results in low student engagement. Therefore, there is a need for innovation in interactive learning media to support concept understanding and enhance students' interest in learning. Digital learning media pose a serious challenge to conventional media; the sustainability of traditional media may be threatened by this competition, making it more difficult to attract and maintain students' interest (Hallin, 2022). Moreover, students' learning interest is influenced by their level of engagement in class therefore, a pleasant classroom atmosphere is essential to gain their full attention (Jariyah et al., 2024; Kinaya et al., 2024)

Students' interest in learning plays an important role in showing how engaged they are during the learning process, which also affects their motivation. Because of this, students need learning media that are more interesting so they do not easily get bored. In many cases, teaching still relies on lecture methods, which makes students less involved and mostly just listen to the teacher. This situation creates a less enjoyable learning environment and leads to low interest in learning. Therefore, it is important to use more interactive learning media to encourage students to be more active, engaged, and motivated in class. This condition is also experienced by students at SDN Mampang Prapatan 01 Pagi, particularly when learning about photosynthesis without the support of appropriate learning media. Students face difficulties in understanding abstract concepts, resulting in low interest and limited active participation during the learning process. Consequently, the learning process becomes less effective and the learning objectives are not achieved optimally. This situation leads fourth-grade students to strongly desire more engaging and interactive learning experiences through the use of instructional media. Therefore, innovation in learning media is needed to present the material in a more visual and appealing way, so that it can help students understand concepts and increase their learning interest.

One of the technology-based learning media is Articulate Storyline. Articulate Storyline is software used to create engaging learning media (Nissa et al., 2021; Ramadhani, 2024). Its advantages include not requiring programming skills and providing features such as videos and quizzes that stimulate students and increase their learning interest. However, it also has limitations, such as requiring considerable time for media design especially for users who are not familiar with multimedia license fees that may hinder access, and dependence on internet connectivity, which can be an obstacle in areas with poor internet access (Lestarani et al., 2023; Sindu et al., 2021).

Learning interest is an important aspect that contributes to students' success in elementary school. Referring to Piaget's theory, students at the concrete operational stage require learning processes that are visual, concrete, and relevant to everyday life, so that the material can be

understood more easily and provide deeper meaning (Asmedy et al., 2025). Learning media play a crucial role in increasing students' learning interest because they provide visual elements that capture students' attention more effectively than conventional methods When learning media support students' independence and allow them to study autonomously at home (Kusmaryono & Basir, 2024). The use of learning media that can be implemented in the classroom through a projector and accessed at home via smartphones for reviewing previously learned material allows students to study without being restricted by time and place. This provides learners with greater opportunities to practice and deepen their understanding independently. Nevertheless, parental supervision is still necessary to ensure that the use of these learning tools remains appropriate and focused. With such support, the learning process can run more effectively and is expected to foster students' learning interest and independence. The use of technology-based learning media has been shown to increase students' interest and engagement (Al Husaeni et al., 2022; Amaliah et al., 2023; Nissa et al., 2021; Puhka et al., 2023). This contributes to improving students' learning interest and participation, as Articulate Storyline accommodates a variety of learning styles by integrating visual, auditory, and kinesthetic elements (Rofi'ah & Widodo, 2024). Learning interest itself consists of several indicators, including enjoyment, curiosity, engagement, attention, and absorption (Apriyani et al., 2022; Kassab et al., 2023; Rahmi et al., 2020; Tang et al., 2022).

This is supported by questionnaire results showing that 94% of students strongly desire a new learning atmosphere, indicating the need for innovative, engaging, and interactive learning media to enhance students' interest and participation in the learning process. Conventional teaching methods, which rely heavily on verbal explanation, often fail to attract students' interest due to the lack of engaging elements. In contrast, digital media allow for higher levels of involvement by encouraging active participation through interactive visual and audio components that make learning more enjoyable (Aleza et al., 2023; Seprie, 2024; Yuniarti et al., 2023). The lack of training for teachers results in the underutilization of learning media, causing the learning process to remain dominated by lecture-based methods, which reduces students' interest in learning. This is supported by questionnaire results showing that 94% of Student Learning Interest Questionnaire when learning involves the use of instructional media. Therefore, the use of engaging and interactive learning media is essential to create an enjoyable learning environment and enhance students' learning interest. Improving students' learning interest requires innovative learning media that is creative, effective, and relevant to current educational needs. This is supported by the use of digital learning media, namely Articulate Storyline, as an innovation that aligns with students' needs. This media offers interactive features and engaging visual presentations, making it effective in increasing students' learning interest and creating a more enjoyable learning experience. Previous studies have shown that Articulate Storyline effectively engages students in science learning, helping them understand material and increasing classroom variation (Hadianto et al., 2023; Pradnyani et al., 2024). The widespread use of Articulate Storyline across various education levels, supported by strong expert validation, highlights its potential as an innovative and smartphone-accessible learning tool.

Learning media has a positive impact in the field of education to increase engagement and make the learning experience more interesting for students (Charline et al., 2024; Haleem et al., 2022; Nurhalimah & Azzahra, 2023; Purnama et al., 2024; Rachmadtullah et al., 2023). In addition to being a tool for conveying information, Articulate Storyline can be used to make

learning interesting and dynamic, increasing students' enthusiasm and interest in learning (Akhlilia et al., 2024). The research found that developing learning media based on Articulate Storyline to increase learning interest, the learning media created is named *Photar*. Improving learning objectives and student interest in learning through the use of media creates a fun and relaxed learning atmosphere when delivering material(Cookson et al., 2020; Hanif et al., 2023; Masrifah & Setyasto, 2024; Munandar et al., 2024). However, previous studies have generally focused on the use of Articulate Storyline and have not specifically developed comic-based digital media in the form of an application for science learning in elementary schools or examined its impact on students' learning interest. Therefore, this study introduces a novelty by developing a comic-based digital learning media in the form of an application called Photar using Articulate Storyline for photosynthesis material in fourth-grade elementary school. This study is expected to contribute by providing innovative and interactive learning media, assisting teachers in delivering science content more effectively, and enhancing students' learning interest and understanding.

2. METHOD

This study was conducted in May 2024 at SDN Mampang Prapatan 01 Pagi using the Research and Development (R&D) method with the ADDIE approach. The use of the ADDIE approach is based on its structured and systematic process, covering stages from analysis through evaluation, which enables a more directed development of Photar media. Moreover, continuous evaluation at each phase ensures that the developed media is appropriate for students' needs and maintains optimal quality. The respondents were all fourth-grade students, totaling 25 students because the small number of students allows all of them to be included as the sample, the data obtained are more representative and can identify the learning media preferred by the students.. The selection of the fourth grade was based on initial observations and the consideration that the school only has six class groups, so this grade was chosen to represent the science learning conditions and the need for learning media development in the school. Data were collected through observation, interviews, and questionnaires to analyze students' needs. The indicators used in the initial learning interest questionnaire included students' feelings of enjoyment and interest in learning. The results of the analysis were used to identify the initial condition of students' learning interest and to determine the need for developing learning media expected to enhance students' learning interest. The steps can be seen in Figure 1.

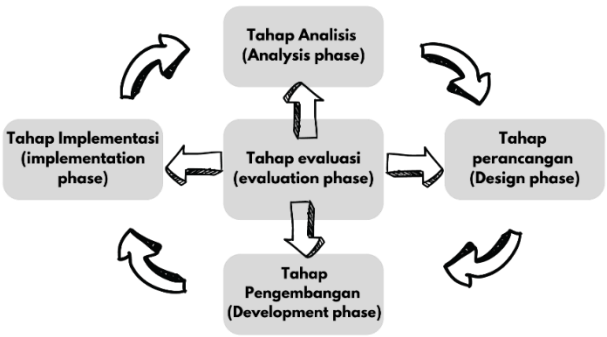

Figure 1. Model ADDIE

The analysis phase was conducted through comprehensive observation in the school environment to identify the target class for the research, as well as brief interviews with teachers. In addition, a student needs questionnaire was distributed, consisting of the enjoyment aspect with indicators of student engagement with learning media, the effectiveness of media in learning, and learning interest with indicators of media attractiveness and engagement with learning materials. The design phase was carried out based on the finding that students expected to learn using learning media, which served as the basis for developing the media concept, designing a flowchart as the navigation path of the media, and creating a storyboard as the design of the interface and button placement. The development phase involved creating the learning media using Articulate Storyline, which was then converted using Website 2 APK Builder Pro to make it accessible on mobile devices. Expert validation was also conducted, including material, media, and language experts. Material expert validation included the content feasibility aspect with indicators of stimulating curiosity, content suitability, content accuracy, alignment with learning objectives, and language use; presentation feasibility with indicators of presentation technique, accuracy of material with images and illustrations, and instructional presentation skills; and supporting material with indicators of relevance to technological development and contextual relevance, totaling 18 items. Media expert validation included media feasibility with indicators of font size, design, animation placement, color use, and character design; accessibility with indicators of ease of use, usage instructions, and repeat usability; and audio with indicators of music selection accuracy and audio clarity, totaling 20 items. Language expert validation included language rules with indicators of language clarity and EYD (Indonesian spelling system) compliance, as well as sentence structure with indicators of clarity, sentence accuracy, and appropriate terminology usage, totaling 10 items. The implementation phase was conducted by demonstrating the learning media in the classroom using a projector, after which students used and interacted with the media directly during the learning process. Student response data were collected through a questionnaire consisting of three aspects: display (media design, sentence clarity, and audio suitability with the material), usability (usage instructions), and benefits (student interest and content relevance), totaling 15 items. The evaluation phase was conducted to assess the suitability of the media with students' learning needs in improving learning interest. The results showed that the Photar media received positive responses in terms of display, usability, and benefits. Overall, both the analysis and implementation phases showed high percentage results, indicating that the media is appropriate and meets students' needs to support the learning process.

The instrument used in this study was a questionnaire with a 5-point Likert scale, developed based on the need for learning media to enhance students' learning interest. The questionnaire consisted of several sections, namely a learning interest questionnaire with 13 items, media expert validation with 20 items, material expert validation with 18 items, language expert validation with 10 items, and student responses with 15 items. Before being used, the instrument was validated by experts to ensure its suitability, with the results showing that the media expert assessment reached 87%, the material expert 88%, and the language expert 86%, all of which fall into the "very feasible" category; therefore, the instrument was declared appropriate for use in the study. The initial questionnaire result of 94% indicates students' need for engaging and interactive learning media. Meanwhile, the final questionnaire result of 93% shows consistently very positive responses, indicating that the developed media can enhance

students' learning interest. All statements in the questionnaire were rated using a 5-point Likert scale ranging from 1 to 5. The following formula was used to calculate the assessment results (Huda & Hakim, 2022):

$$\text{Score Precentage} = \frac{\text{Total Score Obtained (F)}}{\text{Total Score (N)}} \text{x } 100\%$$

The percentage interpretation used to determine the presentation category with the scale used as a reference for assessment can be seen in Table 1.

Table 1. Scale Interpretation

Percentage Score	Interpretation
< 20%	Highly Unsuitable
21% - 40%	Unsuitable
41% - 60%	Quite Adequate
61% - 80%	Worthy
81% - 100%	Highly Recommended

The assessment percentage criteria for students using a Likert scale, after averaging and categorizing, can be seen in Table 2.

Table 2. Assessment Criteria (Safira et al., 2021)

Percentage Score	Criteria
81% - 100%	Strongly agree
61% - 80%	Agree
41% - 60%	Enough
21% - 40%	Disagree
< 20%	Strongly disagree

3. RESULTS AND DISCUSSION

3.1. Needs Analysis Stage

The learning media developed using the ADDIE model approach obtained information during the analysis phase from questionnaires distributed to students, indicating that students have a need to use learning media in the learning process to help improve their learning interest. This is an important step in determining the design of media that aligns with students' needs. The results of the questionnaire on students' desired learning media needs to enhance their learning interest are presented in Table 3.

Table 3. Student Learning Interest Questionnaire

Assessment Aspects	Percentage (%)	Category
Aspects of Feeling Happy	92%	Strongly Agree
Aspects of Attraction	95%	Strongly Agree
Overall Average	**94%**	**Strongly Agree**

The analysis of the students' learning interest questionnaire shows that the aspect of enjoyment, with indicators of student engagement with the media and the effectiveness of the media in learning, reached 92%, indicating that students are highly interested and show positive responses toward the use of learning media. This is reflected in students' tendency to be more actively involved in responding to learning materials when they are presented through media compared to conventional learning. The aspect of interest, with indicators of media attractiveness and material engagement, reached 95%, indicating that learning media can enhance students' learning interest due to their curiosity toward the materials presented in the developed media. Overall, the average score reached 94%, indicating that students have a very high desire to use learning media as an innovation to improve their learning interest.

3.2. Planning Stage

The researcher designed learning media based on Articulate Storyline consisting of several components, namely a cover page titled "Photar," a login page for user identity input, and a main menu that includes several options such as developer information, learning materials, and quizzes. In the materials section, a combination of images and instructional videos is provided to clarify the presentation of the content. The media is also equipped with navigation buttons such as start, next, and back to facilitate users in operating the media. However, in the quiz section, there is no back button available; therefore, once an answer has been selected and the user proceeds to the next question, the answer cannot be changed. In addition, the media interface is designed by considering a combination of colors, fonts, and images to match the characteristics of the material and to attract students' interest.

3.2.1. Learning Objectives

Media designed to increase students' interest in learning about photosynthesis with learning objectives can help them understand the need for photosynthesis, relate it to the process of preserving the earth, and understand the photosynthesis cycle as it relates to everyday life.

3.2.2. Media Production Flowchart

In flowchart planning, it provides an initial overview of the media flow and material placement. The purpose of creating this flowchart is to show the sequence of material display with the media. With the flowchart, the creation of learning media runs according to plan and systematically. The flowchart can be seen in Figure 2.

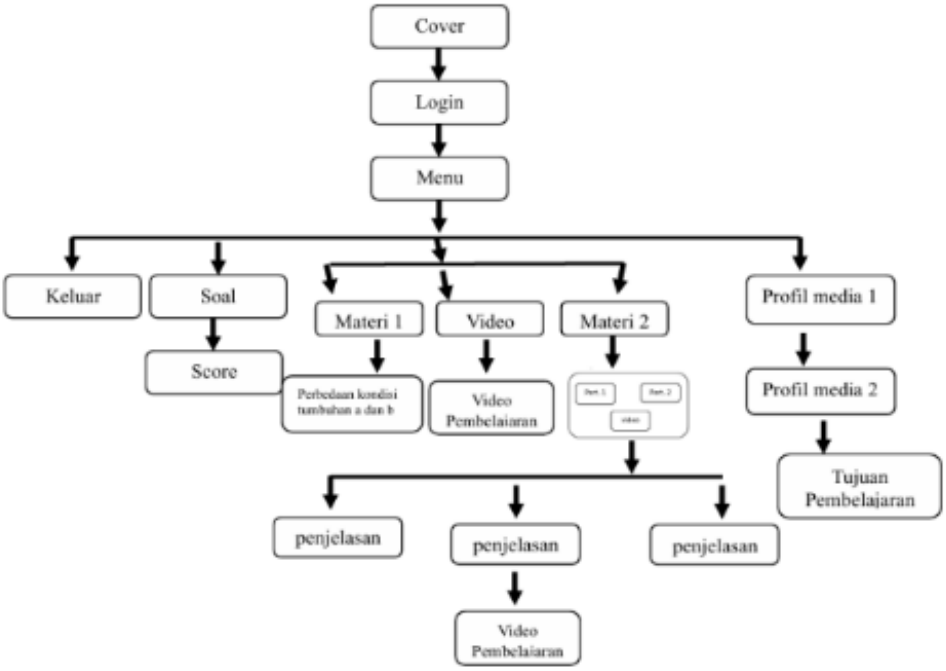

Figure 2. Learning Media Flowchart

Flowchart illustrates how at the beginning, there is a cover display with Photar from the media to make it easier for students to remember it and the intended material. The login section requires students to fill in their personal data, such as name and class. If the personal data is not filled in, the button to proceed to the next menu will not respond properly. Then, the menu section contains information on media creation, materials, and questions. If students select the materials menu, there are three options, namely Material 1, Material 2, and a video about photosynthesis, while the questions menu contains 10 questions that students must answer to determine their level of understanding through the media.

3.2.3. Storyboard Media

A set of sequentially arranged designs used as a guide during the media development process. The storyboard helps the developer visualize the flow, content, and appearance of the media, ensuring consistency and alignment with students' needs. Figure 3 presents the Photar media storyboard.

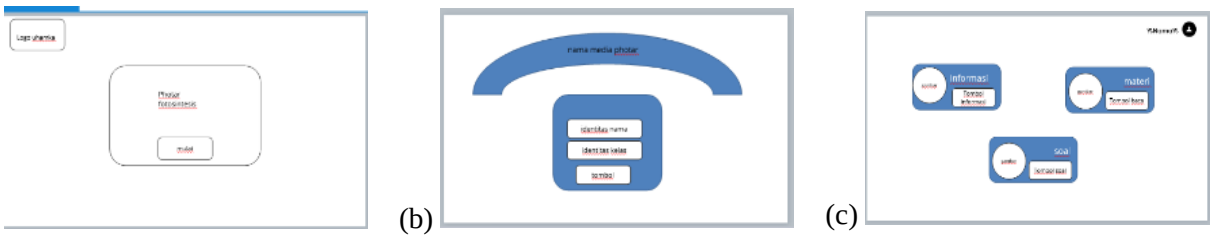

Figure 3. Photar media storyboard first slide as: (a) Cover; (b) Login; (c) Menu

The cover (a) is the first page when opening the Photar learning media. This display provides information about Photar media and photosynthesis material, as well as a start button to enter the next session. The simple design makes it easy for users to navigate. Section (b) is the login page, which is designed to be as attractive as possible with a welcome message to Photar media. The first column in the middle is for entering your name and the second column is for entering your class. Once you have filled in the information, press the button provided. Section (c) is the menu, which has three options: the first is information about the media creator, the second is the material, and the third is questions. The second slide of the Photar media storyboard is shown in Figure 4.

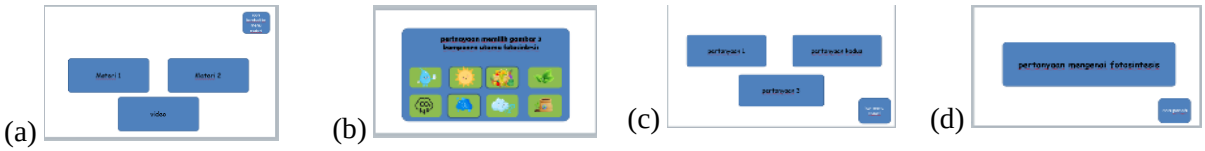

Figure 4. The second slide of the Photar media storyboard consists of: (a) the material menu; (b) material 1; (c) material 2; and (d) a video

The second slide (a) of the material menu contains three main boxes and a navigation button to return to the menu in Figure 2. This button makes it easy for students to move between pages without having to repeat the pages from the beginning; (b) material 1 contains questions for students that can be clicked on the image corresponding to the question. In the lower left corner, there is a back arrow button that will take you to the material menu. If students have selected the correct answer to the question, they will proceed to the next menu in material 1. (c) Material 2 has a main box consisting of 3 questions where students are asked to study and find the answers through explanations. (d) Video: the main box contains questions, and students watch the video after pressing the arrow button below it. Figure 5 shows the Photar Slide 3 media storyboard.

Figure 5. The Photar Slide 3 media storyboard consists of: (a) multiple choice questions; (b) true or false questions; (c) hotspot questions.

Media display photar (a) multiple choice questions, 4 questions discussing the main components of photosynthesis, parts of plants, the role of plants, and statements that correspond to the images provided; (b) true or false questions, 3 questions discussing solar energy, plants through photosynthesis, and Indonesia's lungs ranking 3rd; (c) hotspot questions, consisting of 3 questions, where students click on one of the available arrows. The questions discuss plant parts that capture sunlight, absorb carbon dioxide, and distribute the results of photosynthesis throughout the plant body.

3.3. Development Stage

The development stage produced a learning medium called Photosynthesis Articulate Storyline (Photar) using the 2 APK builder pro website to convert Photar media files into applications that can be used on smartphones, so that students can increase their interest in learning with the Photar media that has been developed. At this stage, the media was created according to the flowchart and storyboard to facilitate media creation according to plan. The following is the Photar media that has been colored to attract students' attention and interest in learning during the learning process. Development Stages of Photar Media is presented in Figure 6.

(a) 

(b) 

(c) 

Figure 6. Development Stages of Photar Media as: (a) cover; (b) menu; (c) score display

Figure 6 consists of several components, including: (a) Cover. The media displays an attractive visual design with enhanced color adjustments while keeping the text readable. The chosen background features natural elements that align with the photosynthesis topic, supporting the delivery of learning material and increasing student engagement. (b) Menu. The menu interface is dominated by blue tones and includes icons that correspond to each function, adding a visually appealing impression. (c) Score Display. This section shows the result after students complete the quiz. When a student achieves a good score, such as 90, the system displays the message “Congratulations, you passed” along with a “√” symbol, indicating that the student has exceeded the minimum mastery criteria. However, if the score is 50, the quiz is categorized as not passed because the student did not meet the required mastery level; therefore, the message “You did not pass” appears with an “x” symbol. The Photar media file was developed according to the flowchart and storyboard, enhanced with audio elements to increase student engagement, and then validated by three media experts, four material experts, and three language experts.

3.3.1 Media Expert Validation

Media validation was conducted prior to implementation in the elementary school setting to ensure that students received learning media that are more qualified, effective, and creative. The media validation consisted of three assessment aspects and 20 statements, which were evaluated by three media experts, as presented in Table 4.

Table 4. Media Expert Validation

Assessment Aspects	Percentage (%)		
	Media Expert 1	Media Expert 2	Media Expert 3
Learning Media Feasibility Aspect	88%	78%	88%
Accessibility Aspect	97%	80%	90%

Audio Aspect	100%	75%	90%
Average Assessment Score	95%	78%	89%
Overall average score		**87%**	
Category		**Highly Recommended**	

Media expert validators assessed the Photar media developed using Articulate Storyline based on three main aspects: the feasibility of the learning media, accessibility, and audio quality. The learning media feasibility aspect evaluated the design, animation placement, color selection, and the size and type of font used. The accessibility aspect examined the ease of use, clarity of instructions, and whether the media could be accessed repeatedly. Meanwhile, the audio aspect assessed the selection of background music and the clarity of audio used in the media.The validation results obtained from the three media expert validators were as follows: Media Expert I scored 95%, Media Expert II scored 78%, and Media Expert III scored 89%. With an overall average score of 87%, the Photar media is categorized as effective and suitable for use by elementary school students. Revisions based on the media validation include several aspects. First, the menu labeled “matri” should be corrected to “materi.” In addition, in question number 8, there is no arrow image as referred to in the question. The validator also suggested that any video used in the media, if it is not originally created by the developer and is included in the Photar media, must properly cite its source.

3.3.2 Material Expert Validation

The material validation was carried out to determine the feasibility of the content presented in the media and to ensure that the material aligns with the learning objectives for fourth-grade elementary students. The validation process covered three aspects and 18 statements related to the learning content included in the media. Four material experts were involved in reviewing and evaluating the accuracy, relevance, and suitability of the material. The results of this assessment are presented in Table 5.

Table 5. Material Expert Validation Results

Assessment Aspects	**Percentage (%)**			
	Materi Expert 1	**Materi Expert 2**	**Materi Expert 3**	**Materi Expert 4**
Content Feasibility Aspects	100%	80%	78%	78%
Presentation Feasibility Aspects	100%	90%	80%	85%
Learning Support Materials	100%	80%	90%	90%
Average Assessment Score	100%	83%	83%	84%
Overall average score		**88%**		
Category		**Highly Recommended**		

The results of the material expert validation were obtained from four validators based on three assessment aspects, namely: content feasibility, presentation feasibility, and supporting learning materials. The content feasibility aspect assessed whether the material encourages knowledge development, aligns with learning objectives, maintains accuracy, and uses appropriate language. The presentation feasibility aspect evaluated the presentation technique,

the accuracy of the material in relation to images and illustrations, as well as the engagement and clarity of the learning content. Meanwhile, the supporting learning materials aspect assessed the relevance of the material to current developments and its contextual integration.The results from the four material experts showed that Material Expert I obtained 100%. Material Expert II obtained 83%, Material Expert III obtained 83%, and Material Expert IV obtained 84%. The overall average score was 88%, indicating that the material presented in the Photar media aligns well with the learning objectives and effectively enhances students' learning interest in the photosynthesis topic. Revisions based on the material validation include the presence of a misconception, namely that the source of food for plants is not oxygen but carbon dioxide. In addition, the images of plants need to be made clearer.

3.3.3 Language Expert Validation

In the language validation, there are two aspects and ten statements related to language rules and sentence structure. This validation was conducted to assess the appropriateness of the language used in the learning media, ensuring that it is not too difficult for students to understand. Three experts were involved in evaluating the language used. See Table 6.

Table 6. Language Expert Validation Results

Assessment Aspects	**Presentase (%)**		
	Language Expert 1	**Language Expert 2**	**Language Expert 3**
Aspects of Language Rules	75%	80%	90%
Sentence Aspects	80%	97%	93%
Average Assessment Score	79%	88%	92%
Overall average score		**86%**	
Category		**Highly Recommended**	

The assessment by the three language experts was conducted to evaluate two main aspects language rules and sentence structure. The language rules aspect includes clarity of language and conformity with standard Indonesian spelling (EYD). The sentence structure aspect assesses whether the sentences are easy to understand, accurate, and appropriate in terms of terminology usage. Language Expert I obtained a score of 79%, Expert II scored 88%, and Expert III scored 92%, with an overall average of 86%. These results indicate that the language used in the media is easy for elementary school students to understand and meets the criteria of the evaluation aspects. There were revisions in the language validation, including correcting spelling such as letter usage and the use of the prefix "di-", as well as differentiating the colors of imperative and interrogative sentences.

3.3.4 Overall expert validation

The overall data collection from the validation results of ten experts, consisting of three media experts, four material experts, and three language experts, underwent a comprehensive feasibility test to determine the combined results of several aspects as presented in Figure 7.

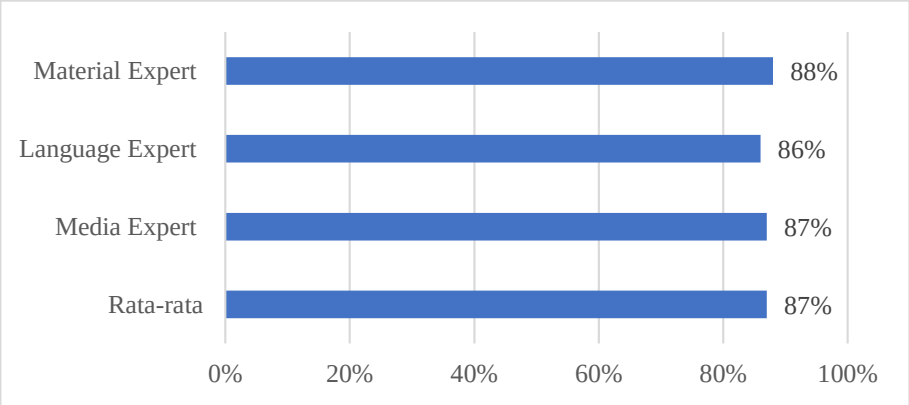

Figure 7. Overall Validation Results Chart

Based on the overall data from the ten experts involved in evaluating the photar media, it can be concluded that the developed media is appropriate for students' needs. This is indicated by the high percentages, namely 88% from material experts, which means the content in the media is aligned with the learning objectives. The language experts' score of 86% shows that the language used is easy to understand, while the media experts' score of 87% indicates that the presentation of the media is appropriate to students' needs and supports the effectiveness of the learning process. Overall, the average score from the ten experts reached 87%, which means the media can be implemented in elementary schools and used as a learning medium to enhance students' learning interest.

3.4. Implementation Stage

At this stage, the learning media that had been developed and validated by experts was implemented at SDN Mampang Prapatan 01 Pagi, specifically in the fourth grade, involving 25 students. The implementation was conducted in one meeting (1 × 35 minutes) to determine the suitability of the learning media based on students' learning interest questionnaires. In practice, the teacher displayed the media using a projector, and students were divided into several groups while using their own smartphones to follow the teacher's instructions. Each student was directed to press the start button and fill in their identity before entering the main menu. The main menu consisted of several options, including an information section containing the developer's identity, materials, and exercises. Students were instructed to study the material first, which was divided into three parts: the first material discussed the process of how plants make food, the second material explained the process of photosynthesis and the role of plants in life, and the third part presented a learning video about photosynthesis. After understanding the material, students proceeded to complete the exercises provided in the learning media.

3.5. Evaluation Stage

At this stage, students have used the Photar media based on Articulate Storyline. Furthermore, students were given an evaluation questionnaire to measure the suitability of the media with their needs and preferences in the learning process. This questionnaire aims to determine the extent to which the Photar media can support the learning process and enhance

students' interest. The findings from the initial questionnaire suggest that students require learning media to support the improvement of their learning interest. This is evident from the high score 94% on the indicators of enjoyment and interest toward the media. Furthermore, the evaluation stage yielded an overall average of 93%, indicating that the Photar media effectively captures students' attention and creates a more enjoyable learning experience. This also implies that the developed media aligns well with students' needs and does not require significant revision. A comparison between the initial responses and the evaluation results reveals a strong consistency, suggesting that the Photar media has successfully met students' expectations. Therefore, the implementation of this media is not only appropriate but also has the potential to foster greater learning interest by providing a more engaging and interactive learning environment. The student response chart is shown in Figure 8.

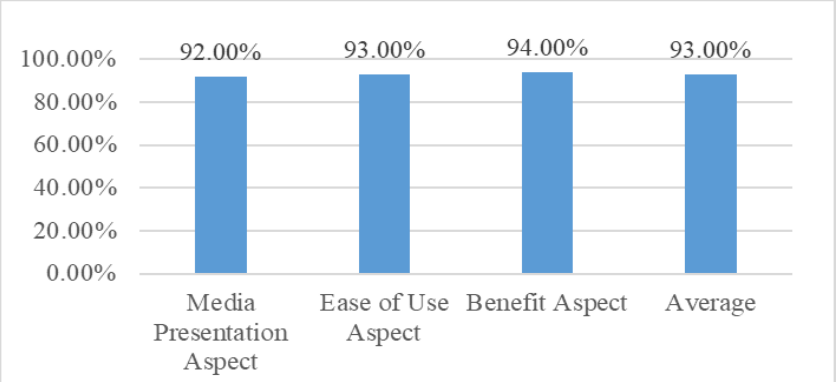

Figure 8. Student Response Chart

Based on Figure 8, the developed learning media has met students' needs in enhancing their learning interest. This is indicated by the high percentages in each aspect, namely the media presentation aspect, which includes indicators such as media design, text clarity, and video suitability, obtaining a score of 92%. In addition, the ease of use aspect, with the indicator of learning media usage instructions, obtained a score of 93%. Meanwhile, the benefit aspect, with indicators of students' interest and material suitability, obtained a score of 94%, with an overall average of 93%, which falls into the very high category. Therefore, the Photar learning media is considered appropriate to meet students' needs and preferences in supporting the improvement of learning interest.

3.6. Discussion

Based on the research findings, the Photar learning media developed using Articulate Storyline is aligned with students' needs and preferences, enabling it to support the enhancement of their learning interest. In addition, it also contributes to improving teachers' understanding of the use of digital media in instructional practices. This finding implies that the integration of educational technology influences not only student outcomes but also the professional development of teachers. The use of Articulate Storyline in the learning process fosters a more interactive and enjoyable learning environment, which subsequently promotes students' interest in learning (Kumbara & Rodliyah, 2021). The effectiveness of the Photar media can be further interpreted through its consistency with prior studies, which highlight that interactive media can

facilitate the achievement of learning objectives while simultaneously increasing student engagement. Such engagement is also shaped by the novelty factor, as the media introduces a new learning experience that encourages curiosity and active involvement among students. Moreover, the incorporation of visual, audio, interface design, and interactive features presented in a game-like format plays a crucial role in helping students comprehend abstract concepts such as photosynthesis. This approach not only enhances cognitive engagement but also supports students' affective involvement during the learning process. As a result, the use of this media positively influences students' participation and level of engagement (Norsidi & Suwarno, 2024; Nursalam et al., 2023)**.** The expert validation score of 87% demonstrates that the Photar media has met the required feasibility standards for classroom implementation. Nevertheless, the feedback provided by experts indicates that further improvements are necessary to optimize its effectiveness when applied in real learning settings. In addition, students' responses after using the Photar media reached 93%, reflecting a highly positive perception of its use in the learning process. Therefore, it can be concluded that Photar media based on Articulate Storyline is not only appropriate for use but also significantly contributes to enhancing students' cognitive development and teachers' knowledge of instructional media, increasing learning attractiveness, strengthening student engagement, and ensuring compatibility with the needs and characteristics of elementary school learners.

Developing *Photar* media using articulate storyline is not difficult, just like using PowerPoint, as is publishing the developed media. The creation process does not require programming language, making it easier for users to create and publish learning media (Juniantari et al., 2021). In terms of benefits, the Photar media includes materials and questions with varied question types to enhance students' interest in learning, making them more engaged when using the Photar media. This is done to ensure that the questions are varied and not monotonous, so that students do not get bored when working on the questions (Melisandi & Lazulva, 2023). Students stated that this was their first experience using technology-based learning media, which made them feel happy to use the media. In addition, students stated that they enjoyed using the media for learning, but some admitted that they had difficulty grasping important information in the media (Zahratunnisa et al., 2024). The Photar media, which has been converted using the 2 APK builder pro website into an application that can be installed on smartphones, makes students interested in the developed Photar media. The media can be accessed online or offline and can be accessed easily and used anytime. This allows students to repeat the learning material by accessing Photar media to strengthen their understanding anytime and anywhere (Kumbara & Rodliyah, 2021; Nababan et al., 2023; Suharsiwi et al., 2023; Suwastini et al., 2023; Widiasanti et al., 2023).The use of Articulate Storyline-based Photar media has a significant impact because it can increase students' interest in learning. This Photar media can be used freely anywhere, so that students' understanding of the material is not limited to school. Articulate Storyline-based Photar media contains a cover, login, main menu, material explanation, and material menu consisting of material 1, video, and material 2. Material 1 contains questions about the main components of photosynthesis, the differences between plants a and b, questions about why leaves are green, and explanatory videos, while material 2 contains three questions: how plants find food, what is the difference between plants and living things, and why photosynthesis is called an important process on earth. In the video section, there are two explanatory videos about photosynthesis. The information section includes the identity of

the media creator and the learning objectives. The questions section contains three types of questions: multiple choice, true or false, and hotspot.

The *Photar* media is based on Articulate Storyline. There is a shortcoming in the media display when it is used on a smartphone, as there are three lines on the right side when it is used. If the three lines are clicked, the entire media content can be viewed. The learning media display presented on a smartphone is not fully displayed because there is a screen limiter from Articulate Storyline (Junpahira & Pahlevi, 2023). When students work on questions in Photar media, teachers cannot see their scores and they can restart the questions. Teachers cannot monitor students' work on the questions. If they want to collect the scores, they need to take a screenshot first (Selsabila & Pramudiani, 2022). The use of Photar media without continuous training can make students reluctant to use it again. The potential of the media will decrease if it cannot be utilized optimally (Hadianto et al., 2023).

Developing media in line with the times to support the learning process will motivate teachers to create meaningful and memorable updates in teaching photosynthesis material with good technology (Daryanes et al., 2023; Schubatzky et al., 2023). Photar based on Articulate Storyline with a combination of photosynthesis material can increase students' interest in learning and has an attractive appearance to motivate students to learn. Students are more interested in media that uses technology as an innovation. This achievement in Articulate Storyline is effective in increasing learning interest and understanding of material virtually, and attractive and interactive media tend to be more capable of encouraging student engagement in the learning process (Firdaus et al., 2022; Heliawati et al., 2022). Additionally, this research requires a considerable amount of time to be accepted in various schools. Access to Photar media is still limited in schools with smartphones. Inadequate facilities and infrastructure, such as not all students having cell phones, and not all parents being able to afford cell phones (Winda & Dafit, 2021).

4. CONCLUSION

Based on the findings of the study, the *Photar* learning media developed using Articulate Storyline has been designed in accordance with students' needs and characteristics, enabling it to promote an increase in their learning interest. Its effectiveness is evident in its ability to deliver an interactive and engaging learning experience, which in turn enhances student participation. This is further supported by the expert validation score of 87%, indicating that the media is appropriate for implementation at the elementary school level, as well as student responses reaching 93%, reflecting positive perceptions of its use in the learning process. Therefore, this research contributes to SDN Mampang Prapatan 01 Pagi by introducing a digital learning medium that is interactive, innovative, and effective. Moreover, the Photar media also facilitates the improvement of teachers' knowledge in utilizing digital media within instructional activities.

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