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Development of interactive learning multimedia based on Somatic, Auditory, Visual, Intellectual (SAVI) approach assisted by Articulate Storyline 3 on circular motion material

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Abstract
There are limited learning approaches and laboratory facilities regarding developing interactive learning multimedia for circular motion material. Therefore, this research aims to develop interactive multimedia learning based on the Somatic, Auditory, Visual, and Intellectual (SAVI) approach assisted by Articulate Storyline 3 on circular motion material. This research is a type of research and development of the ADDIE model. The respondents involved were 31 students in class XI MIPA B and XI MIPA C. Experts validated the product from media, material, and language aspects. Product validity was analyzed using the Aiken V technique. The Aiken V index scores were 0.89, 0.92, and 0.89 for assessing media, material, and language aspects. The practicality assessment resulted in an average of 96%, which shows high practicality in the learning context. In conclusion, this SAVI-based interactive multimedia has been validated by experts and is well received by students. So, it has proven to be very suitable for effective learning at Darussalam Rajapolah Integrated High School, Tasikmalaya. This research implies that the development of interactive learning multimedia based on the Somatic, Auditory, Visual, and Intellectual (SAVI) approach assisted by Articulate Storyline 3 on circular motion material can be a solution to overcome the limitations of traditional learning approaches and laboratory facilities in teaching the concept of circular motion.

Keywords: write a maximum of five keywords, words not included in the title but important in the text

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I. Introduction

In the 21st century, the education sector is faced with the demand to harmonize knowledge, skills, attitudes, and proficiency in Information and Communication Technology (ICT) to prepare learners for global challenges [1]–[3]. In this knowledge era, where technology and information are the main drivers of knowledge synergy, the education sector faces the challenge of adopting a futuristic learning orientation [4]. Education is no longer just about mastery of the material but also engagement with the environment and utilization of technology for the betterment of society. This is in line with the transformation of the education system, which is no longer limited to classrooms and books as the only source of knowledge [5].

In this context, the biggest challenge for education units is to present learning that is not only informative but also relevant to daily life and supports the use of technology. Advances in educational technology are an important response to this change, allowing educators to integrate various surrounding phenomena into learning. Physics subject, especially in Integrated Senior High School Darussalam Rajapolah, is often

considered difficult for students. Needs analysis and interviews showed that as many as 65% of representatives of students in class XI MIPA experienced difficulties in learning physics. The majority of students face difficulties, especially in the mathematical aspect of complex and complicated material, where they are more likely to memorize formulas rather than understand the concept of the material.

Learners also voiced a desire to use diverse approaches in physics learning to increase motivation and avoid boredom in the classroom. Furthermore, they stated that education is better when presented with interesting media, such as videos, demonstrations, or practicums. Learners feel they understand concepts better when given the opportunity to see demonstrations or practicums first, then guided to discover the concept. The importance of learning media, especially multimedia, is increasingly evident, with research showing an increase in the effectiveness of teaching media [6], [7], mastery of concepts [8], [9], and students' creative thinking ability [10]. However, in physics learning, students often struggle to understand abstract concepts such as circular motion [11], [12].

The impact of the continuous use of conventional learning approaches tends to make students passive and less involved [13], [14]. Therefore, a learning approach that is more interactive and relevant to students' daily lives is needed. In this context, the Somatic, Auditory, Visual, and Intellectual (SAVI) approach emerges as a solution that allows students to actively engage in the learning process and improve understanding and learning achievement [15], [16]. In an effort to overcome these problems, the development of interactive learning media based on the SAVI approach is a strategic step. The use of Articulate Storyline 3 software is expected to present physics learning materials in a structured, planned, and systematic manner [17]. The advantage of this software lies in its ability to support the visualization of physics phenomena through attractive images and animations.

Several previous studies have tried to integrate technology into learning, especially through the development of e-learning applications to increase student participation [18]–[20] [11], [12], [13]. What distinguishes this research from previous studies includes 1) The application of a project-based learning model that emphasizes contextual aspects; 2) The choice of different e-learning platforms; 3) the Integration of SAVI (Somatic, Auditory, Visual, and Intellectual) approach to improve the overall understanding of the material. Therefore, this research not only updates the digital learning platform but also opens up new dimensions to improve learning in the digital era.

Thus, this research aims to develop interactive learning media based on the SAVI approach, supported by Articulate Storyline 3 software, especially on circular motion material. This step is expected to improve the gap between expectations and reality in physics learning at Darussalam Tasikmalaya Integrated High School.

II. Methods

This research uses the Research and Development (R&D) method. The development research design used in this research is ADDIE. There are five stages: analysis, design, development, implementation, and evaluation [21]. The analysis phase begins with analyzing the needs of learning media development through interaction with physics educators and students in class XI MIPA at Integrated High School Darussalam Tasikmalaya Regency, using interviews and needs analysis questionnaires. The goal is to ensure the alignment of learning media development with the school curriculum by understanding the needs related to circular motion material and studying Basic Competencies as the basis for the subject matter in the media.

The Design stage, the second step in the ADDIE model, is focused on the design of learning media. The author designs interactive teaching materials with the SAVI approach and Articulate Storyline 3, discussing the subject matter of circular motion. The design process involves making flowcharts, storyboards, media selection, and material preparation. Relevant multimedia and virtual laboratories are also considered in accordance with the learning material.

The Development stage involves producing learning media using the Articulate Storyline 3 application, making products in HTML Web based on the SAVI approach. The product goes through the testing stage by the developer, evaluation by the supervisor, and validation by the validator. Revisions are made based on feedback and suggestions from this stage. The implementation phase involves students of MIPA Class XI at Darussalam Integrated High School in Tasikmalaya Regency using the learning media after it has been validated by media and materials experts. The implementation process involves classroom trials followed by using a feedback questionnaire to measure the practicality of these media.

The Evaluation stage requires an assessment of the interactive learning media as part of the implementation. Modifications to the resulting product are made based on feedback and recommendations from expert validators of media, materials, language, and the level of practicality through student responses

during the implementation process. The trial participants in this study included students in grades XI MIPA B and XI MIPA C at Darussalam Integrated High School in Rajapolah Tasikmalaya who had yet to learn circular motion material in the even semester of the 2023/2024 academic year.

The study employed various data collection techniques, including school observations, student interviews, and questionnaires. The questionnaires included needs analysis, interactive learning multimedia validation, and practicality questionnaires. Descriptive statistical techniques were used to analyze the interview results, while the learners' needs were analyzed by calculating the percentage of answers to each questionnaire item. Validation of the level of validity was conducted by linguists, digital experts, media experts, and material experts using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Aiken's V technique was employed to process the results. The equation (1) was then applied [22],

$$V = \frac{\sum S}{n(c-1)} \tag{1}$$

With the information, V is the validation value, S as r-lo is the difference between the score given by the validator and the lowest score, lo is the lowest assessment number (e.g., 1), c is the highest assessment number (e.g., 5), r is the number given by the validator, and n is the number of respondents. After obtaining the value of the media validation results of the experts, the validity criteria can be seen in accordance with Table 1 [23].

Table 1. Table 1. Validity Criteria

Nilai	Criteria
$0.8 < V \leq 1.0$	Very Valid
$0.4 < V \leq 0.8$	Fairly Valid
$0 < V \leq 0.4$	Less Valid

After the validity test, the interactive learning multimedia was revised based on the experts' suggestions. Furthermore, students tested the multimedia by filling out questionnaires to collect the necessary data. The data is then used to evaluate the usefulness of the learning media and test the level of practicality. The determination of the level of practicality was carried out using the percentage (2) formula:

$$P = \frac{F}{n} \times 100\% \tag{2}$$

With the information, P is the value or presentation of the answer, F is the score, and n is the maximum score. After obtaining the value of media practicality from the students' questionnaire, it can be seen the criteria for media practicality according to Sugiyono by Table 2 [24].

Table 2. Criteria for Media Practicality

Achievement Rate (%)	Category
90 – 100	Very Practical
80 – 89	Practical
65 – 79	Practical enough
55 – 64	Less Practical
0 – 54	Not Practical

III. Results and discussion

Analysis Stage

In the ADDIE research and development model, the first step is to conduct a needs analysis to evaluate the sustainability and requirements of new product development. The results of the analysis include observation data related to learning at the Darussalam Integrated High School in Tasikmalaya Regency, which is detailed in Table 3.

Table 3. Observation Analysis Results

Aspects	Indicator	Description
Types of Learning Media in the Classroom/School	Availability of Learning Media in Classroom/school	Speaker, Projector, Projector Screen, Props
	Availability of ICT Facilities	Computer Laboratory
	Availability of Learning Media on Circular Motion	Blackboard, Projector, Projector screen, Speaker
Interactive Learning Multimedia	Availability and use of Interactive Multimedia in learning Circular Motion	
Interactive Learning Multimedia Using the SAVI Approach	Availability and use of Interactive Multimedia using the SAVI approach in learning Circular Motion	

The results of interviews with grade XI teachers and analyzing the needs of students through questionnaires. The findings show that there are challenges in physics learning, such as the teacher-centered approach, which is considered boring, constraints in implementing practicum, and limited technology facilities at school. In addition, the needs analysis of learners highlighted the interest in using interactive learning multimedia, especially website/HTML-based, with the hope of developing attractive, accessible online and offline and integrating the SAVI approach. The development process involves the Articulate Storyline 3 platform as a communication tool with animation features and a simple interface, providing advantages over conventional learning media.

Design Stage

In the design stage, the second step involves creating an interactive learning media design focused on circular motion material for class XI MIPA students at Darussalam Integrated High School in Tasikmalaya Regency. This process includes creating a flowchart, as seen in Figure 1, which aims to clarify the flow of making learning media.

After that, the storyboarding is done by arranging the intro page, menu scene, and multimedia arrangement based on the physics teaching module class X and class XI student package book using the SAVI approach. Details of the arrangement can be found in the corresponding Table 4.

Table 4. List of Multimedia Preparation with the SAVI Approach

SAVI Indicator	Brief Explanation	Interactive Multimedia
Somatic	Hands-on or physical activity where learning by experiencing and doing	Make observations, practicums, and commands according to the directions in the multimedia.
Auditory	Students are invited to learn by listening to the explanation. Afterward, they should be able to retell what they heard.	The audio-visual presentation includes video illustrations, material exposure, and device directions.
Visual	Students can learn using the sense of sight by observing images, texts, videos, and other multirepresentations.	Presentation of illustrative videos, presentation of material, and presentation of directions for using the device in the form of text and images
Intellectual	Learning by involving thinking in solving problems encountered by students	This includes practicum activities, working on sample problems, their application to everyday life, stimuli, and quizzes.

Finally, formatting the learning multimedia involves collecting backgrounds, images, animations, and audio using various software and online media sources. All these elements are assembled using the Articulate

Storyline 3 platform. The resulting multimedia is converted into HTML web format and uploaded online, allowing offline and online access through various devices. The initial appearance of the multimedia is presented in Figure 2.

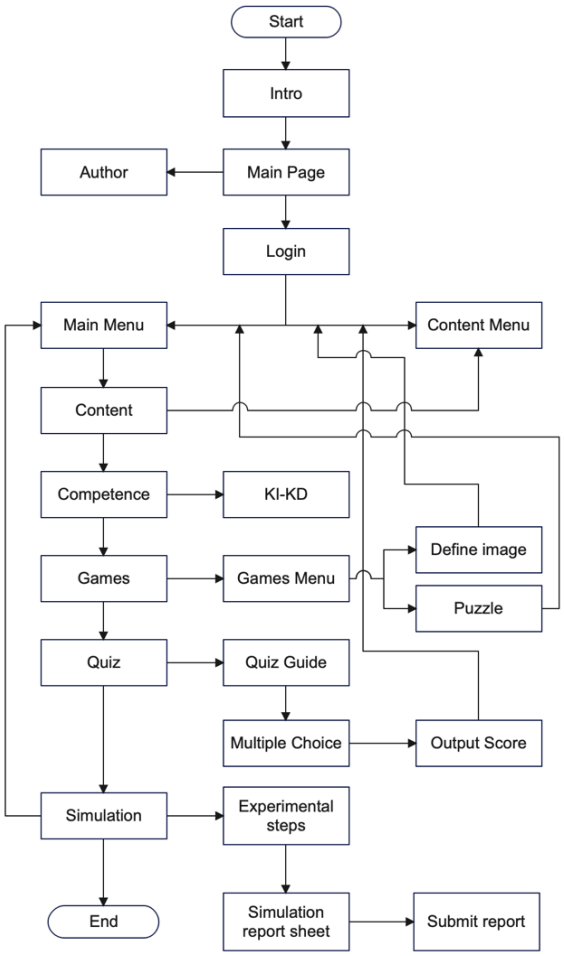

Figure 1. Flowchart of Multimedia Product Development Design Procedure

Figure 2. Multimedia Intro Display

There are significant differences in the learning approach in the development of HTML Web-based interactive learning multimedia using Articulate Storyline 3. This multimedia is designed using the Somatic,

Auditory, Visual, and Intellectual (SAVI) approach. The integration of SAVI in the presentation of material aims to enable learners to explore concept understanding through personal learning experiences. The results of the needs analysis support the learners' need for learning that involves personal experience, according to research findings by [25].

The development of this multimedia specifically pays attention to the elements expressed in the needs analysis. Each learning material is organized to include images, videos, and practical simulations. Images are integrated to provide clear visualization. Videos are used to observe real phenomena related to the material, and practical simulations allow students to conduct experiments through the media.

Not only that, but the multimedia presentation is designed to be manageable, and some of the material is presented in the form of videos to reduce complexity. The material is not too brief, presenting conceptual and mathematical explanations in detail so learners can understand it. Examples and practice problems are accompanied by clear discussions to facilitate learners' understanding.

This learning multimedia solution also aligns with previous research findings, which state that multimedia can help students learn circular motion material by entertaining and presenting concepts using a combination of text, graphics, animation, audio, and video [26]–[28]. According to Surjono, this multimedia's interactivity level is high because there is video navigation, page navigation, menu/link control, feedback-response, simulation control, and games in it [29]. Feedback-response is applied to practice questions, providing users with information about the answer's correctness and explanations related to the selected answer. The simulation control allows the user to set up the simulation according to the experimenter's needs.

The final product of this interactive learning multimedia can be accessed through easily shared links, providing flexibility and ease of access to learners. The advantages of flexibility and access availability support learning without being bound by time and place and increase students' interest in learning. Thus, this multimedia not only fulfills students' learning needs but also provides innovative and responsive solutions to modern learning needs.

Development Stage

Before testing a product, validation is carried out by a team of media, material, and language experts to determine the feasibility of learning products. The evaluation process uses a questionnaire with a Likert scale of 1-5, assessing the suitability of each question item with the predetermined indicators. Saifuddin supports the importance of validation to ensure the product can be tested properly. The following information regarding the results of media expert validation can be found in Table 5 [30].

Table 5. Media Expert Validation Result Data

Assessment Aspect	Validation Value (V)	Criteria
Visual Display	0.90	Very Valid
Software Engineering	0.88	Very Valid
Average	**0.89**	**Very Valid**

The results of the media expert evaluation, covering visual aspects and software engineering with a total of 14 indicators, showed an excellent level of validity with an Aiken index of 0.89. The average score of material expert validation that meets the criteria is very valid, especially in visual aspects (0.90) and software engineering (0.88). In this context, the emphasis on visual aspects is very important, indicating that the presentation of multimedia, including text, images, video, sound, and animation, effectively attracts students' attention during learning. This opinion is in line with previous research, which emphasizes the effectiveness of visual components in creating interest and attraction in learning multimedia [31], [32]. Further information regarding the material expert validation results can be found in Table 6.

The material expert evaluation involved aspects of material, SAVI approach, and appearance/presentation with a total of 16 indicators. The material expert validation showed an Aiken index of 0.92, reflecting an excellent level of validity. The average validation score met the criteria of highly valid in each aspect, with the presentation obtaining the highest score of 0.94. The SAVI approach aspect had a validity score of 0.93, highlighting the identification of SAVI methods and their effectiveness in improving student understanding as well as learning motivation. The support of learning multimedia is recognized as an important element in the teaching process, in line with previous research that emphasizes the effectiveness and joy of learning with

multimedia that attracts students' interest [33]. Finally, information regarding the results of media expert validation can be found in Table 7.

Table 6. Data on Material Expert Validation Results

Assessment Aspect	Validation Value (*V*)	Criteria
Material	0.90	Very Valid
SAVI Approach	0.93	Very Valid
Material Display/Presentation	0.94	Very Valid
Average	**0.92**	**Very Valid**

Table 7. Data on Language Expert Validation Results

Assessment Aspect	Validation Value (*V*)	Criteria
Straightforward	0.93	Very Valid
Communicative	0.80	Very Valid
Language Suitability with Material	0.89	Very Valid
Average	**0.89**	**Very Valid**

The results of the validity evaluation by linguists involved three main aspects, namely straightforwardness, communicability, and suitability of language to the material, with 15 indicators. Straightforwardness dominated with a validation index of 0.93, indicating that linguists positively assessed the material's ability to be delivered clearly and easily understood. Meanwhile, the communicability aspect scored 0.80, reflecting a good level of validity in facilitating effective communication through the material. On the other hand, the suitability of the language to the material obtained a score of 0.89, confirming that the language used was appropriate to the context of the material presented. These findings align with previous research, which highlighted that using straightforward, communicative, and simple language can help students understand the material better [34], [35].

Implementation Stage

The students in class XI MIPA at SMA Terpadu Darussalam Kabupaten Tasikmalaya will use the learning multimedia after it has been approved by media experts, material experts, and linguists. As part of the rollout of the learning multimedia, students will be tested in class. A feedback questionnaire will then be given to measure the practicality of this media. Information about the practicality of test results can be found in Table 8.

Table 8 Results of Learner Practicality Assessment

Assessment Aspect	Percentage (%)	Criteria
Multimedia Learning	97.1	Very Practical
Learning Motivation	97.4	Very Practical
Learning Design on Multimedia	95.7	Very Practical
Language and Communication	96.1	Very Practical
Average	**96.6**	**Very Practical**

Based on the practicality test data analysis results, SAVI interactive learning multimedia for students of Darussalam Rajapolah Tasikmalaya Integrated High School received a percentage score of 96.6%, indicating a high level of practicality. Practicality evaluation involves four aspects, with the highest scores on multimedia learning (97.1%) and learning motivation (97.4%). The availability of videos as a learning tool is recognized as helping students understand the material effectively, according to the research of Hamidi et al. [36] and the views of Rahmi and Alfurqan [37] on improving student understanding through audio and visual learning media.

Evaluation stage

During the implementation stage, interactive learning multimedia should undergo assessment. Feedback and recommendations from media expert validators, language materials, and students should be taken into account to modify the resulting product. The strengths and weaknesses of the multimedia should then be analyzed. According to evaluations from material experts, media experts, and students, using SAVI-based multimedia with Articulate Storyline 3 for circular motion material offers several advantages. These include a) Improved learning experience through the SAVI approach, b) Easy navigation of multimedia, c) Unrestricted access and repetition of material, and d) Facilitation of practicum and games to reduce student boredom with learning.

Another feature of multimedia learning is using color, graphics, animation, and sound, making the learning process more interesting and enjoyable [34], [38]. Another advantage is that it allows repetition of material if it needs to be understood. Multimedia also provides practical convenience without being constrained by distance and time, allowing learning anywhere and anytime [39], [40]. Although interactive learning multimedia based on the SAVI approach has the disadvantage of no feedback mechanism that can be saved, this study proposes an alternative solution with screenshots or manual recording of student evaluations. The results of this study, by the stages of the ADDIE development model, concluded that this SAVI-based interactive learning multimedia is highly valid and practical.

In addition to the advantages and privileges of the development of interactive learning multimedia, this interactive learning multimedia has several limitations, including a) Field trials of interactive learning multimedia only involve students in grade XI of Darussalam Rajapolah Integrated High School, Tasikmalaya; b) Developers only evaluate the feasibility and practicality of SAVI Approach-based Interactive Learning Multimedia with the help of *Articulate Storyline* 3 on circular motion material, without exploring the effectiveness in the learning process.

IV. Conclusions

Conclusion Based on the findings of research and development of interactive learning multimedia using the SAVI technique and the Articulate Storyline 3 platform on circular motion content, the following conclusions may be drawn: a) The creation of interactive learning multimedia based on the SAVI technique and the Articulate Storyline 3 platform using circular motion content is a highly good category. The product's validity is determined by the validation test results, which include the Aiken index computation by material specialists, media experts, and linguists. The material expert validation test resulted in a validity value of 0.92 with a very valid category, the media expert validation test in a validity value of 0.89 with a very valid category, and the linguist validation test in a validity value of 0.89 with a very valid category. b) Creating interactive learning multimedia utilizing the SAVI technique and the Articulate Storyline 3 platform on circular motion material is quite feasible. The product's practicality is determined by the results of a practicality test administered to students. Students in class XI MIPA B and XI MIPA C integrated high school Darussalam Rajapolah Tasikmalaya scored 96% on the practicality test, with a very practical category.

Based on the constraints and limitations in this study, further development of learning multimedia can be suggested as follows: a) It is necessary to develop interactive multimedia with the SAVI approach on various materials, not just circular motion, to enrich learning variations; b) Involve a larger number of learners with diverse school backgrounds in the trial to increase the representativeness of the results; c) Innovate the content by adding more interesting interactive elements and utilizing the latest technology; d) Refine the feedback system to provide in-depth insight into the progress of learners that educators can access; e) Integrate experimental research to quantitatively measure the impact of multimedia use on learning achievement, with an analysis of the effectiveness of learning in a certain period. All of these suggestions are expected to guide the optimization of the development and implementation of interactive multimedia learning based on the SAVI approach.

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