

DEVELOPMENT OF INTERACTIVE LEARNING MEDIA BASED ON ARTICULATE STORYLINE 3 OF THE IPAS PROJECT TO IMPROVE SCIENTIFIC LITERACY SKILLS

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ABSTRACT

Development of interactive learning media on social interaction, communication, socialization, social institutions, and social dynamics in the IPAS Project using the Articulate Storyline 3 application to improve students' scientific literacy skills in class X at SMKN 1 Puloampel, Serang District. This research is a Research and Development (R&D) using the ADDIE model procedure (Analyze, Design, Development, Implementation, Evaluation). The study's results were based on media expert validation of 86% and material expert validation of 90%, so the learning media product was declared very feasible to use. As for the response of media users from students, 82%, and the response of media users from teachers, 97%, the criteria for these two values were stated to be very good for use in learning. The effectiveness of the media has a normalized score gain of 0.66 with a medium criterion interpretation, so the learning media is quite effective in increasing students' scientific literacy skills.

Keywords: *Articulate storyline 3, interactive learning media, scientific literacy*

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INTRODUCTION

The emergence of the fourth industrial revolution amid the rise of information and communication technology (ICT) collaboration between cyber technology and automation technology. In other words, ICT has enabled developments in various life settings and encouraged industrial transformation by developing interactions between electronic devices, machines, and humans. The era of the Fourth Industrial Revolution presents excellent opportunities and challenges for pedagogical innovation in various educational environments in realizing innovative learning processes as 21st-century learning to prepare competencies needed in the future (Ramaila & Molwele, 2022); (Costa et al., 2022); (Indarta et al., 2022). According to Hanafi (2012) and Sasmito et al. (2015), the challenge of education in vocational

schools is to develop learning strategies that provide knowledge, skills, and learning experiences to the demands of the business and industrial world (Prianto et al., 2020). Efforts to support this strategy through a curriculum tailored to the needs because the curriculum is the heart of the academic centre that can realize the goals and objectives of the education system (Shafi et al., 2020).

Curriculum as an educational tool must be developed dynamically to respond to the demands and changes of society. Conceptually, the designed curriculum development must pay attention to the principle of relevance to current developments in science and technology (Hidayat, 2021). The Merdeka Curriculum is here to answer challenges in national education, officially implemented on February 11, 2022 (Kemdikbudristek, 2022b). The Minimum Competency Assessment Program is one of the national education policies from the Free Learning Curriculum program as a substitute for the National Examination; this program is a mapping effort to measure the minimum competency level of student's literacy and numeracy (Hattarina et al., 2022); (Indarta et al., 2022); Prijowuntato et al., 2022). 21st-century learning is characterized by a learning process that emphasizes learning skills, namely critical thinking, creativity, collaboration, communication, and literacy skills. Literacy skills are language skills when communicating, for example, reading, speaking, listening, and writing based on rules and objectives (Hendrik & Dewanto, 2020).

In the implementation of the Independent Curriculum at the SMK level, science, and social studies subjects are taught simultaneously (holistic) under the name of the Natural and Social Sciences Project (IPAS Project), applicable to all expertise programs at grade X level in Phase E (Kemdikbudristek, 2022a). The IPAS project helps students learn how to use scientific ideas to solve real-world problems in the 21st century related to natural and social events around them, besides that the IPAS project refers to scientific literacy competencies, namely explaining phenomena, designing and evaluating scientifically (Umami et al., 2021). Scientific literacy relates to efforts to develop human resources with scientific solid thoughts and attitudes, as well as the ability to convey scientific results and research to the general public effectively (Nuraini & Waluyo, 2021).

According to Fensham (2008) in the UNESCO Science Report forum 2008 stated that scientific literacy is part of an essential issue for making science education policies, according to The Organization for Economic Co-operation and Development (OECD) in the Program for International Student Assessment (PISA) in 2015, that Indonesian students were ranked 64th or the acquisition of an average science score in the scientific literacy domain was 403 with the number of PISA participants participating in 72 countries (Narut & Supradi, 2019). Based on data from the 2018 PISA results, as many as 79 countries participated in this program. As many as 30% of students from Indonesia could only reach level 2 in the PISA Framework, while the rest could only reach level 1a. The types of PISA questions at level 2 are about simple experimental designs. Students can use contextual knowledge and build knowledge systematically to find solutions scientifically,

analyze data, and identify topics to be solved (Kamil et al., 2021). Thus the need to increase literacy skills for Indonesian students who are still low (Kemendikbud, 2019).

Social Sciences (IPS) is a new study implementing the Independent Curriculum at the Vocational High School level. IPS analyzes various areas of life around the students, such as the physical and social environment, so that they can holistically identify and analyze a problem from multiple studies (Supardan, 2015). Improving social studies learning outcomes begins with improving self-regulation strategies, practising social skills, increasing critical thinking skills, and solving problems so students can construct their knowledge (Maksum et al., 2021); (Purbasari et al., 2019). Creative and productive learning refers to social studies learning management by designing digital-based learning (Chanchumni & Mangkhang, 2021). Social studies learning material abstractly requires visualization that utilizes technology in this digital era using learning media (Salamah et al., 2022).

Development of learning media as a means of increasing teacher abilities by the Regulation of the Minister of National Education Number 16 of 2007 concerning Standards for Academic Qualifications and Teacher Competency explaining the use of information and communication technology in learning to achieve learning objectives. According to Gerlach & Ely (1971), the notion of media in the learning process as graphic, photographic, and electronic tools for capturing, processing, and rearranging visual or verbal information (Arsyad, 2014). Briggs (1970) revealed that learning media are physical tools that provide learning materials to encourage student learning activities. Briggs (1970) showed that learning media are physical tools that provide learning materials to promote student learning activities. Teachers should not choose and use media based on the teacher's interests. Instead, the teacher makes media according to the needs of students to achieve learning goals (Suryani et al., 2019). The procedure for selecting instructional media begins with a needs analysis, which includes the basis for selecting media based on student characteristics, competencies, teaching content features, and the media setting (Cahyadi, 2018).

The articulate storyline three application is a type of media that can be used as interactive teaching material, meaning that the teaching material in the press combines several other learning media such as video, text, or graphics and is interactive because it can control orders or treatment from the user so that in its use, this interactive media can be the most suitable and enjoyable media choice (Prastowo, 2015). The articulate storyline app generates creative activities for students, such as scenario-based learning activities, quizzes, knowledge checks, and games. This app is one of the top writing tools because of its intuitive user interface with lots of interaction and innovation (Erickson, 2020). his application produces web-based media projects in HTML5 with Flash or application files (dot) exe, which can be applied to PCs, laptops, tablets, and Android-based smartphones (Amiroh, 2019).

RESEARCH METHOD

This research is a Research and Development (R&D) (Sugiyono, 2019), the stages in this development research was adapted using the ADDIE model procedure, which stands for Analyze, Design, Development, Implementation, and Evaluation (Tegeh et al., 2014).

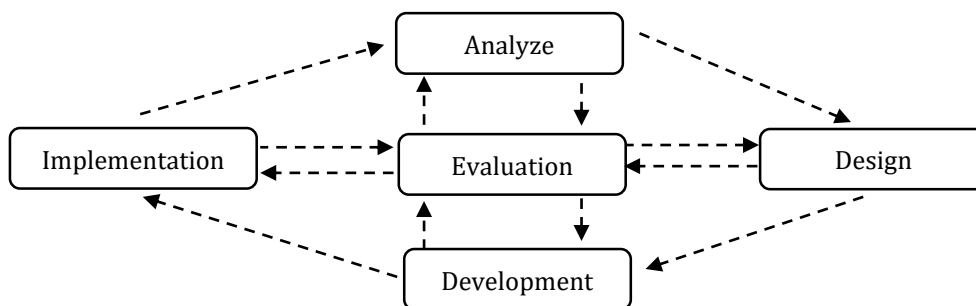


Figure 1.
The Stages of The ADDIE Model

This development research was held at SMKN 1 Puloampel with the Nonprobability Sampling technique using the Purposive Sampling technique for class X TITL 1 as many as 30 students (Sugiyono, 2019), implementation is carried out in the even semester of the 2022-2023 school year. Data collection techniques were obtained based on observation, interviews, and filling out questionnaires and tests.

Data analysis techniques use two groups of analysis techniques, namely: (1) Qualitative descriptive data analysis techniques, namely data analysis techniques obtained based on direct observations, interviews, and recommendations from material experts and media experts in the form of product responses that have been developed and product improvements or revisions to be used; (2) Quantitative descriptive data analysis techniques, namely analyzing the data collected based on predetermined instrument entries in expert validation questionnaires, user responses, and student learning outcomes tests.

Table 1.

Criteria Expert Eligibility/Validation	
Score	Criteria
5	Strongly agree
4	Agree
3	Agree
2	Disagree
1	Strongly Disagree

Source: Sugiyono (2019)

Questionnaire results validation analyzed with an equation:

$$P = \frac{\sum X}{\sum Xi} \times 100\% \dots\dots (1)$$

Notes:

P = Percentage of score

$\sum x$ = Total score expert

$\sum xi$ = Total maximum score

Table 2.
Interpretation Criteria

Rating (%)	Interpretation Criteria
0 - 20	Not Feasible
21 - 40	Less Feasible
41-60	Fairly Feasible
61 - 80	Feasible
81 - 100	Very Feasible

Source: Muhajirin & Maya (2017)

The questionnaires are used to assess the practicality of the media. The Likert scale with a score of 1-5 is used to organize validation sheets and user feedback questionnaires.

Table 3.
Categories Likert Scale Assessment

Score	Criteria
5	Strongly Agree
4	Agree
3	Fairly Agree
2	Disagree
1	Strongly disagree

The Percentage is calculated using the following formula:

$$P = \frac{\sum X}{\sum Xi} \times 100\% \dots (2)$$

Notes:

P = Percentage score

$\sum X$ = Total score respondent

$\sum Xi$ = Sum score maximum

Table 4. User Practical Category

Evaluation (%)	Interpretation Criteria
0 - 20	Not Good
21 - 40	Less Good
41-60	Enough
61 - 80	Good
81 - 100	Very Good

The equation for the effectiveness of interactive learning media based on the results of the pretest and posttest values is:

$$(g) = \frac{T_f - T_i}{SI - T_i} \dots (3)$$

Notes:

(g) = Normalized Gain

T_f = Posttest score

T_i = Pretest score

SI = Maximum score

Table 5.

Normalized Gain Interpretation	
Gain Score (g)	Criteria
(g) ≥ 0,7	High
0,3 ≤ (g) < 0,7	Medium
0,3 > (g)	Low

Source: Hake (1998)

RESULTS AND DISCUSSION

Based on the results study in accordance goals and procedures study ADDIE model development, so results development product is as follows.

Analysis Stage

At this stage, it is carried out through observation and interviews along with the results of the analysis of these stages, namely: (1) Curriculum analysis for SMKN 1 Puloampel in the 2022-2023 academic year uses the Implementation of the Independent Curriculum (IKM) with independent changing categories; the IPAS Project on the subject in this study is about social interaction, communication, and socialization, social institutions and social dynamics. This subject examines social phenomena that exist around our lives which are studied scientifically by applying scientific concepts and competency elements referring to scientific literacy competencies; (2) analysis of the characteristics of students in addressing the lack of motivation and literacy culture in finding information related to problems in the learning process is due to a lack of media and teaching materials that attract students' attention.

Based on the analysis of the needs of students in the learning process is by preparing learning media that can attract students' attention, ease of use, support in achieving learning goals and be up to date. This aligns with research Gu et al. (2019) that student's ability to identify scientific information from new media significantly correlates with their scientific literacy skills.

Design Stage

At this stage, the design process for producing learning media products is based on the results of needs analysis and theoretical studies, first, compiling an initial draft of the product concept in the form of a storyboard. The first step is to collect

references to teaching materials based on learning objectives about social interaction, communication, outreach, social institutions, and social dynamics, then select learning media applications appropriate to the analysis of student needs in the school where this research was carried out, namely using the Articulate Storyline 3 application with specific considerations including several development studies that have been carried out using the application because it has several advantages, including the output results of this application can be published and run on Android-based Smart Phone devices that can be used offline (Dinda et al., 2020), The output is in the format of HTML5 because the product from this media can be run online using a PC or laptop computer (Safira et al., 2021), the resulting media product can be designed with the concept of a game (Heliawati et al., 2022), and users of this interactive media product show a positive response and improve critical thinking skills (Wahyuni et al., 2022).

The next step is to collect supporting data using appropriate text, images, video, and audio materials based on learning objectives. The storyboard design consists of two main parts, viz: (I) *The opener* in this section is the initial page starting the use of the media, consisting of the title, identity, and user login; And (II) *The homepage* consists of (1) General Instructions, this section includes an introduction, instructions for using the media, learning objectives, dimensions, and achievements of the Pancasila Student Profile (P3); (2) Learning materials, in this section, consists of 5 sub-subject matters of learning about social interaction, communication, socialization, social institutions, and social dynamics; (3) Ability test, in this section, is part of the formative assessment of the material that has been submitted and contains eight questions with the types of questions in the form of multiple choice, true or false statements, matchmaking, and choice answers; (4) A glossary, in this section, is a collection of essential word lists or terms; (5) Developer Info, this section contains profiles of researchers and research supervisors; (6) Bibliography.

Development Stage

At this stage, it produces a prototype as a learning media product that refers to and translates based on the design stage using the Articulate Storyline 3 application. Before field testing, the learning media product is subjected to a product feasibility validation test from experts or validators. This learning media feasibility test phase uses two validators: a media expert competent in information and communication technology and a material expert skilled in sociology. Table 6 below shows the validation result from both media and material experts.

Table 6.
Results of Media Expert Validation

No	Aspect Evaluation	Total Score	Percentage (%)	Criteria
1	Media Contents	22	88	Very Feasible
2	Media communications	26	87	Very Feasible
3	Media Packaging	22	88	Very Feasible
4	Medium Accuracy	16	80	Feasible
Average			86	Very Feasible

Source: Modification of McAlpine & Weston (1994); Chaeruman (2019)

Based on the results of the validation of media experts based on Table 6 above, the value for each aspect of the assessment is in the criteria of very feasible, except for the aspect of the accuracy of the media obtaining a value of 80 or the criteria are feasible. However, the acquisition of the total average value of the validation results of media experts is 86%; these results interpret that the media product is very suitable for use as a learning medium.

Table 7.
Results of Material Expert Validation

No	Aspect Evaluation	Total Score	Percentage (%)	Criteria
1	Content Material	19	95	Very Feasible
2	Suitability Draft	22	88	Very Feasible
3	Suitability Material Present	22	88	Very Feasible
4	Depth Material	18	90	Very Feasible
5	Suitability Reference	9	90	Very Feasible
Average			90	Very Feasible

Source: Modification of McAlpine & Weston (1994) (Chaeruman, 2019)

Material validation results based on Table 7 above show that the value for each assessment aspect is within the criteria of "Very Feasible," with a total average score of 90%; these results interpret that the material content of the media product is very feasible for use in learning.

Product revisions are carried out according to the direction of the validator or experts and users. The product revision process is critical to review the weaknesses and deficiencies of the product. The following is input or recommendations for improving the design of learning media product drafts from each validator in several aspects, including:

- 1) Opening, media experts provide revisions to the aspects of media communication to complete the identity, including the title, target, and name of the developer and supervisor.

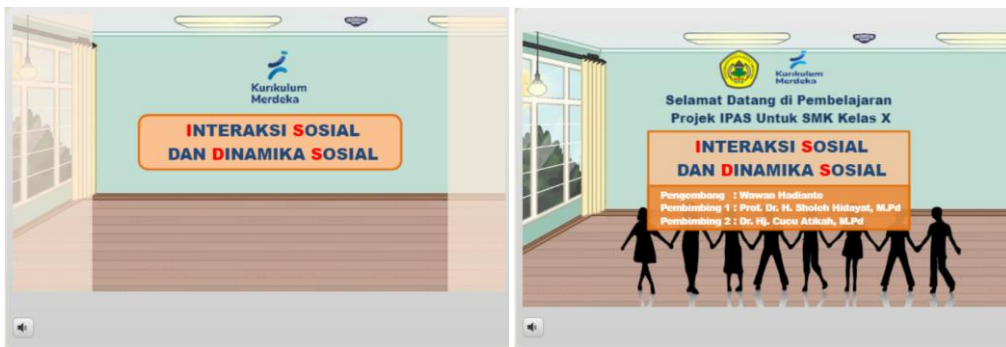


Figure 2.

Draft Opening Page Display Before & After Revision

- 2) Material menu, media experts provide revisions to the aspects of media communication to provide exact names of material titles and instructions.



Figure 3.

Display of the Prior Media Menu Page Revision

- 3) General instructions, media experts provide revisions to aspects of media communication to provide an introduction in the form of an overview of the contents of the media.



Figure 4.

Display of the Instructions Menu Page General Before & After Revision

- 4) Learning materials, media experts provide revisions to aspects of media communication to provide a general illustration of the videos shown.



Figure 5.
Material Menu Before & After Revision

- 5) Ability test, the material expert provides revisions to the suitability aspects of the current material to provide question numbers and instructions for working on the questions.



Figure 6.
Competency Test Page Before & After Revision

Implementation Stage

Learning media products that have been validated and revised, the next stage is applied in the field. Media products are used in the learning process in the classroom as learning media. This stage aims to test the practicality or user response and the effectiveness of the media products used on students' scientific literacy abilities.

The following is a graphical image of the response to media use by teachers and students.

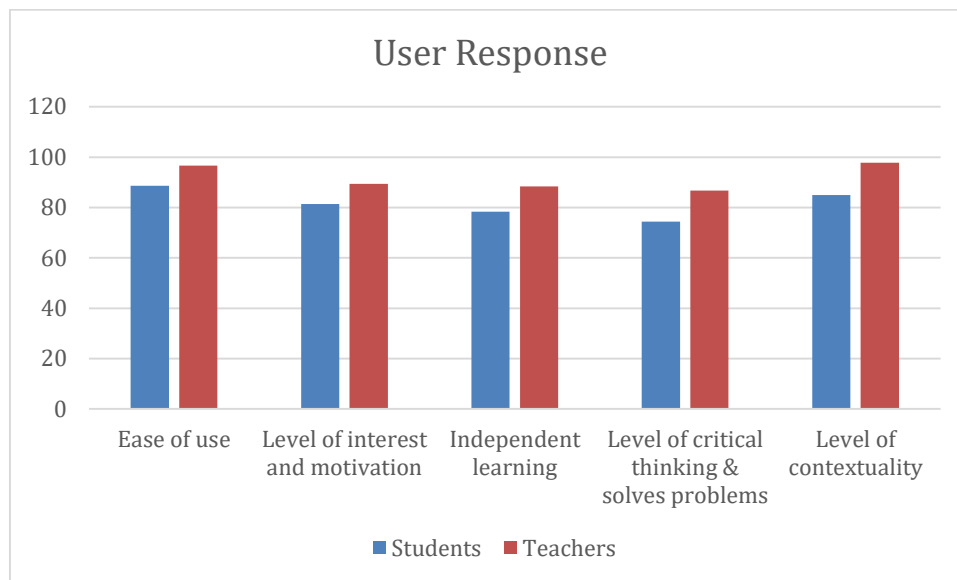


Figure 7.

User Response Graph

Based on Figure 7 above, the results of the user response analysis of 30 students and three teachers, in the aspect of ease of use, the response values for students and teachers were 89% and 97%, respectively, all stating that this media is in the excellent category; user response on the aspect of the level of interest and motivation, the results of student and teacher responses were 81% and 89%, respectively, so this media is included in the excellent category, meaning that this media has a positive impact on learning. However, the value is slightly reduced for students' responses to independent learning and critical level of problem-solving, respectively 78% and 74% or have good criteria. To increase the level of critical thinking to solve problems is to train by habituation and solve problems independently (Wahyuni et al., 2022). Regarding contextuality, the response value for students' and teachers' responses was 85% and 98%, respectively, and all stated that this medium was in the excellent category. The average student and teacher responses were 82% and 97%, respectively, indicating that the media was very well used in learning.

Test the effectiveness of using media based on the results of the pretest and posttest on the social interaction, communication, socialization, social institutions, and social dynamics of the Science Project subjects to measure scientific literacy skills; the results are as shown in Table 8.

Table 8.

Score of Scientific Literacy Ability

Component	Pretest	Posttest	Gains	Category
Lowest Value	20	60		
Top Rated	60	97	0.66	Medium
Average	40	79.6		

Based on Table 8, the average pretest value is 40, and the posttest value is 79.6, so the gain score for scientific literacy ability is 0.66; according to Hake (1998), the Normalized Score Gain Interpretation is in the medium category. This category shows that interactive learning media based on Articulate Storyline 3 concerning social interaction, communication, socialization, social institutions, and social dynamics is quite effective in increasing scientific literacy skills. The measurement of scientific literacy ability tests contains three indicators: Identification of Scientific Problems, Explaining Phenomena Scientific and Using Scientific Evidence (Kristiani et al., 2022).

Evaluation Stage

At this stage, collect data from each stage of the ADDIE model procedure as a refinement and evaluation that has been carried out. The goal is to determine the level of competency achievement and the quality of learning using the learning media.

In general, the response of users to learning media is in an excellent category; positive responses appear in several aspects, including ease of use, level of interest or motivation, independent learning, level of critical thinking, problem-solving, and level of contextuality. The learning objectives have been fulfilled if the average student response to media use is greater than or equal to 80% (Wahyuni et al., 2022). Interactive learning media based on Articulate Storyline 3 integrates several other media, such as video, audio, text, or other graphics. The ease of use of these products can be published to Android-based PCs, laptops, tablets, and smartphone applications. The value of product effectiveness based on the Pretest and posttest results is quite effective in increasing students' scientific literacy skills. These results are in line with previous studies that have been conducted (Rismawati & Rubianto, 2018); (Istighfarini et al., 2022).

CONCLUSION

Learning media development based on Articulate Storyline 3 on social interaction, communication, socialization, social institutions, and social dynamics of the IPAS Project subject for class X SMK is declared very feasible to use as a learning medium. The media expert validation results were 86%, and the material expert validation results were 90%. The user response from students was 82%, and the user response from the teacher was 97%, or the criteria for these two values stated that students and teachers used this learning media very well. The media effectiveness value has a Normalized Gain of 0.66, or is in the medium criterion interpretation; this learning media is quite effective in improving students' scientific literacy skills.

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