

ARTICULATES STORYLINE MEDIA-BASED DISCOVERY LEARNING FOR TRAINING STUDENTS CRITICAL THINKING SKILL

Fhina Noviyanti*, Lulu Tunjung Biru, and Septi Kurniasih

Science Education Study Program, Faculty of Teacher and Education, Sultan Ageng Tirtayasa University, Serang, Banten, Indonesia

*Email: 2281180008@untirta.ac.id

Received: December 14, 2022. Accepted: January 11, 2023. Published: January 30, 2023

Abstract: Critical thinking skills are crucial skills to be mastered by students in the 21st century. Critical thinking skills are also needed in the learning process, one of which is science learning. The Articulate Storyline learning media was developed to overcome students' need for critical thinking skills in science lessons. The research carried out is a development research (R&D) based on the Borg and Gall development model conducted by the Puslitjaknov Team. This study aims to analyze the level of validation of the Articulate Storyline learning media based on discovery learning in science learning in training the critical skills of junior high school students. The instrument involved in this study was an expert validation test questionnaire. The data presented in the study are qualitative and quantitative. Material experts who received validation results reached 88% in the "very valid" category, media experts got 100% in the very valid category, and science teachers scored 84% in the "valid" category. The discovery learning-based Articulate Storyline learning media that was developed has a good level of validation and can be used to train students' critical abilities.

Keywords: *Articulate Storyline, Discovery Learning, Critical Thinking Ability, Learning Media*

INTRODUCTION

Critical thinking skills in the 21st century have become one of the skills that students must master. Critical thinking can activate all students' reasoning so that the lessons received will feel more meaningful and increase the meaning of knowledge for students. Critical thinking skills are also crucial in every subject, one of which is used in Natural Science subjects. As contained in the Curriculum Center, science lessons have learning characteristics that require students' involvement in scientific activities [1]. The scientific process in science lessons means that students can carry out learning activities from the problem-solving stage to inferring from what they have learned [2].

Critical thinking skills can help students analyze data and information systems based on observations to find and solve a truth, as well as in scientific processes that require the activeness of various students' thoughts. So, critical thinking skills are interrelated with scientific activities in science lessons [3]. As said by Zakiah, critical thinking ability is the ability to think that has the activation of components of other skills. Among these components is the ability to analyze arguments, make conclusions from what has been obtained and understood based on inductive and deductive reasoning, and make decisions or provide a solution to a problem and an assessment or evaluation [4].

The student's critical thinking ability is very close to the implementation of science learning. However, based on research that Purnamasari has done, it is known that the learning process that links students' critical thinking skills in Indonesia still needs to be in a low category and requires

redevelopment [5]. Moreover, based on the results of observations made by researchers, it is known that science learning that has been held in these schools still needs to be more supportive of training students' critical thinking skills. It is caused because the science learning process practiced in schools only tends to carry out the transfer of understanding and does not provide opportunities for students to seek understanding that comes from the results of their discoveries.

Less attention is paid to the learning models commonly used to support learning processes that can train students' critical thinking skills. The average learning models often used in science learning are lectures, modeling, practicum, and demonstrations. The use of learning media in the three schools has involved technology, especially Powerpoint. At the presentation stage, the media only includes text displays that can make students feel bored and heavy, especially when science learning is directed at practicing critical thinking skills.

Lack of familiarization with students to practice critical thinking skills in science learning can cause difficulties for students to find and defend arguments and find solutions related to science studies concerning everyday life. Students tend to have difficulty solving their problems and increasing their level of thinking if their critical thinking skills have yet to be trained optimally. Familiarizing students to train their critical thinking skills in the field of education can be done by making the ability to think critically as a unit in every learning process that is carried out continuously [6].

Implementing science learning that can involve critical thinking skills is carried out by planning learning following the 21st-century learning paradigm formulated by the Ministry of Education and Culture, which requires student-centered learning, so in planning the selection of learning models, there needs to be readjustment. The Ministry of Education and Culture mentions several learning models that can be used, namely discovery learning, project-based learning, problem-based learning, and inquiry learning [7].

Having a lesson plan that can motivate students to think critically is necessary. Students must be treated as learning subjects when designing learning that focuses on developing their critical thinking skills. The discovery learning model is one of the models that can be used in designing learning that can develop students' critical thinking skills. The discovery learning model is suitable for science learning because it can help students understand the ideas covered in science studies [8].

There has been a lot of research done on how the discovery learning model affects how well students can think critically. Sutoyo and Priantari's research suggests that students' critical thinking abilities can be enhanced by incorporating learning planning into the discovery learning model [9]. Model use research discovery learning Zakrah also conducted to train essential thinking skills in science subjects, which stated that the model discovery learning influences increasing students' critical thinking skills in science subjects [10].

Learning media can also be a supporting force in motivating students to practice their critical thinking skills. Advances in technology can help the presentation of learning to be more interactive. Articulate Storyline is one software that can be used in manufacturing learning media. Articulate Storyline can produce learning media that can incorporate graphic components inside the use of images, sounds, music, and the addition of several animations to the interactive quiz creation feature. Learning media with Articulate Storyline can be accessed by students offline through smartphones or PC, thus making students play a full role in the use and learning [11].

Using Articulate Storyline in learning has been proven by Nurfajriani in his research which discusses improving students' creative thinking skills. The results show that there is a difference in the average creative thinking ability of students who are taught using learning media articulate Storyline-based discovery learning (the average value is 1.82%) with those who do not use articulate Storyline (mean value 1.56%) [12]. Using Articulate Storyline research conducted by Wulandari can also increase students' critical thinking skills by developing teaching materials assisted by interactive media Articulate Storyline [13].

In addition to choosing the suitable learning model, Sugiarti explained that contextual learning could positively affect the development of students' critical thinking [14]. Environmental pollution is one of the materials that is well contextualized for students. Environmental pollution still requires serious attention, especially during this pandemic which causes a lot of waste. Waste that can arise from pandemic cases, such as increased use of single-use masks, increased medical waste, and increased use of disinfectants which, if not handled properly, can cause new environmental problems.

With this problem, learning can be oriented to motivate students to practice their criticality by combining it with a discovery learning model that can invite students to play an active role in using all of their understanding. In this study, the learning materials on the media raised the theme, "Is my Earth back?".

Through the explanation above, it is necessary to have a more interactive learning plan by presenting updates to learning media to motivate students to practice their critical thinking skills. The authors will develop interactive learning media that optimizes technology-based development discovery learning. Then the title of the research that was appointed was "Validation of Learning Media Articulate Storyline Based on Discovery Learning in Training Students' Critical Thinking Skills."

RESEARCH METHODS

The Educational Policy and Innovation Research Center Team (Puslitjaknov) modified this study's Borg and Gall development model using the R&D (Research and Development) development method. The research only used three steps, which are as follows: 1) Developing an analysis of the product; (2) Creating the first product; (3) Revision and validation by experts [15].

The instrument used in this study was a Likert scale-based validation questionnaire. Two expert lecturers are needed to validate learning media: a media expert to validate the media and a material expert to validate the content or materials. In addition, it involved three expert practitioners, namely science teachers at SMP and MTs Pandeglang. Data collection occurred at the Sultan Ageng Tirtayasa University Campus, SMPN 1 Pandeglang, SMPN 3 Pandeglang, and MTsN 1 Pandeglang. From the results of instrument validation, qualitative and quantitative data will be obtained. Quantitative data is obtained from the results of calculations using the formula below:

$$P = \frac{\sum x}{\sum y} \times 100\%$$

with description:

$$\begin{aligned} P &= \text{Eligibility Percentage} \\ \sum x &= \text{Total Score Obtained} \end{aligned}$$

Σy = The Maximum Number of Questions (Modifikasi Akbar) [16].

The calculation results obtained will be obtained in the form of validation categories as follows:

Table 1. Category of Defense Media Validation

Percentage of Average Value	Category	Information
85%-100%	Very valid	Very good to use
69%-84%	Valid	It can be used with minor revisions
53%-68%	Quite valid	It can be used after major revisions
37%-52%	Not valid	It cannot be used
20%-36%	Invalid	It cannot be used

RESULTS AND DISCUSSION

Results of The Development Discovery Learning-Based Articulate Storyline Media in Training Students' Critical Thinking Ability

Through a series of stages of development research, a product was obtained in the form of

Articulate Storyline learning media with the theme "Will My Earth Restore?" in training students' critical thinking skills. The results of this product development can then be accessed via Android students so that they can optimize their use.

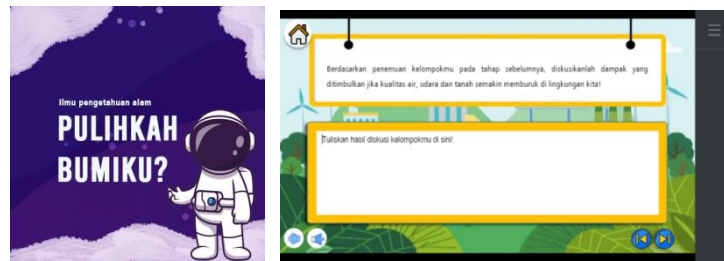


Figure 1. The Final Result of Learning Media. (a) Product Covers; (b) Product Content

In the study, the theme "Is My Earth Restored?" Students' critical thinking skills are trained by solving contextual cases of the impact of the COVID-19 pandemic that pollutes the environment. The discovery learning model is used to support these learning activities. The context of the material raised in this theme uses a connected integration model that can connect concepts in the material raised.

The selection of material content with the theme "Recovering my Earth" can create contextual learning about the state of the earth or the environment during the pandemic that not only causes problems for human health but can cause environmental pollution through the remnants of medical waste. Hence, the selection of this material is very related. Close to the discovery learning

model. so that students can find solutions to overcome these problems and, of course, can train students to raise their critical thinking skills.

Material Validation on Learning Media Articulate Storyline Based on Discovery Learning in Training Students' Critical Thinking Skills

The stage of getting input and determining the level of material validation in learning media based on the evaluation of material expert lecturers is material validation. At this stage, three assessment parts are used to validate the material. The assessment consists of components of content feasibility, presentation, and components of critical thinking content. Table 2 shows the results of material validation on learning media.

Table 2. Material Validation Results

No.	Component Evaluation	Percentage Validation	Category
1.	Content Eligibility	94%	Very Valid
2.	Presentasion	85%	Very Valid
3.	Critical Thinking Content	85%	Very Valid
Material Validation Results		88%	Very Valid

The results of material expert validation which have three assessment components, namely the feasibility of content, presentation, and critical thinking content, can be seen from the validation level obtained, which is 88% included in the "Very Valid" category. Therefore, the content in the learning media is excellent and can be utilized in science education, particularly to develop students' critical thinking abilities.

The content feasibility assessment component obtained a validation result of 94% in the "Very Valid" category, which is the average result of the four sub-components, meaning that in terms of the feasibility of the material in the learning media. It is very good and can be used to train students' critical thinking skills and follow Core and Basic Competencies learning. The requirements for good material eligibility follow the achievement of competence [17]. Then the material in this media can be used as filler in the learning process.

Good presentation techniques must also support a good content feasibility component. The results of the validation of the presentation assessment component reached 85% with the "Very Valid" category. It means that the presentation of learning media in terms of material is very good and can be used. The presentation of learning in learning media can include four characteristics of science, namely, the characteristics of science as an attitude. In their presentations, students can practice bringing up scientific attitudes and concern for the environment by fact-finding the lousy impact caused by COVID-19 waste.

Characteristics of science as a procedure, in learning media, there are steps to solving problems

Media Validation on Learning Media Articulate Storyline Based on Discovery Learning in Training Students' Critical Thinking Skills

The purpose of validating learning media through the point of view of media experts is to

through the elaboration of actions discovery learning, namely starting from problem identification to generalization. The third characteristic of science that appears in the learning media is the characteristic of science as a product, namely in the form of an explanation of the material for the respiratory system in humans, substances, and mixtures. And the last characteristic is science as an application. The learning media presents the results that it has found as a solution to overcome the surrounding environment due to COVID-19 waste, which can be used as an application step in protecting the environment.

Learning media Articulate Storyline-based discovery learning aims to train students' critical thinking skills. So the critical thinking content assessment component is important to be validated. The result of the validation of the critical thinking content component is 85%, with the category achieved as "Very Valid," which indicates that the validation of the material in terms of critical thinking content is very well presented in the learning media. It is very good to train students' critical thinking skills. In the learning media, there are five indicators to be trained which are connected to the learning model discovery learning, namely identifying or formulating questions to a fact of the problems presented, considering the suitability of data collection sources, presenting hypotheses and conclusions, acting by providing further explanations and uncovering problems, and arranging problem-solving. Syntax discovery learning can motivate students to start thinking in depth and systematically [18].

analyze the level of validation of learning media Articulate Storyline based discovery learning in improving students' critical thinking skills. The results of the validation by media experts are described in table 3 below.

Table 3. Media Validation Results

No.	Component Evaluation	Percentage Validation	Category
1.	Graphics	100%	Very Valid
2.	Language	100%	Very Valid
3.	Programming	100%	Very Valid
Media Validation Results		100%	Very Valid

The validation results by media experts obtained a percentage score of 100%, with each component of the assessment achieving the expected score. In media validation, learning Articulate Storyline-based discovery learning achieves a very valid category for training students' critical thinking skills.

The results of the validation of the graphic component obtained a validation result of 100% with the "Very Valid" category. Based on the validation results, the graphic component of the learning media Articulate Storyline has been presented very well. It can be used to train students' critical thinking skills. The layout used in this learning media is based on three principles of

drawing a good layout according to Gumelar, namely the suitability of proportions (use of media size adapted to the context of the content), balance (density of content per slide on the media) and contrast or focus (color adjustment, writing titles tailored to the needs of learners) [19].

More than the graphic component adapted to the three principles is needed to make learning media usable in learning. The next thing that needs to be considered is the use of language in learning media. Based on the validation of the linguistic components, a score of 100% was obtained in the Very Valid category. The linguistic components presented in the learning media are very good and appropriate to be used in the learning process to improve student's critical thinking skills. The level of validation in learning media depends on the linguistic component. Language becomes a tool to convey learning information, making it easier for educators and students to achieve the objectives of learning competencies. In line with this,

Wicaksono explained that the use of language is one of the most important aspects of learning because it can encourage students to participate in learning activities [20].

Furthermore, in the validation of programming components obtained, a percentage of 100% which is included in the "Very Valid" category. Through this, it can be concluded that programming in learning media is very good to be applied in the media. Many alternatives can be used to use the Articulate Storyline learning media so that users get the same benefits. The media can be based on its usefulness and users' trust in the information system [21].

Validation of Learning Media by Science Teachers

Learning media validation test results Articulate Storyline-based discovery learning to improve students' critical thinking skills carried out by the three science teachers can be seen in table 4.

Table 4. Results of Learning Media Validation by Science Teachers

No.	Component Evaluation	Validator			Average Percentage Validation	Category
		Teacher 1	Teacher 2	Teacher 3		
1.	Content Eligibility	89%	76%	82%	82%	Valid
2.	Presentation	75%	69%	75%	73%	Valid
3.	Programming	100%	88%	100%	96%	Very Valid
Final Validation Results					84%	Valid

In the table above, the final validation results reached 84%, which means that this learning media based on the average results of the three teachers was included in the category "Valid." Namely, learning media Articulate Storyline-based Discovery Learning can be used to train students' critical thinking skills.

CONCLUSION

It was determined that the learning media validation level reached the very valid category. Articulate Storyline software and discovery learning models make learning media very good for developing students' critical thinking skills. Material validation resulted in "very valid" results with a score of 88%, media validation resulted in a "very valid" rating of 100%, and science teacher validation resulted in a rating of 84%, namely "valid." Teachers and students can use this discovery learning-based Articulate Storyline learning media using Android or iOS.

REFERENCES

[1] Haqiqi, A. K., Rahmawati, R. F., Azizati, Z., Sulistyani, U. N. L., & Albar, W. F. (2022, November). Virtual laboratory-based learning media training for MGMP IPA teachers at

Madrasah Tsanawiyah in Kudus Regency. In The 4th International Conference on University Community Engagement (ICON-UCE 2022) (Vol. 4, pp. 101-106).
 [2] Nurhapsari, R., Sutarto, & Mhardika, I. K. (2016). Pengembangan Model Pembelajaran PDC (Preparing, Doing, Concluding) untuk Pembelajaran IPA. *Jurnal Pembelajaran dan Pendidikan Sains*, 1(1), 9–16.
 [3] Saragih, S. R. D., & Yusrani, N. (2019, March). The Effect Of Genius Learning Model On Genetic Personality In Al-Mudzakir Early Childhood Education Students. In Multi-Disciplinary International Conference University of Asahan (No. 1).
 [4] Santos, L. F. (2017). The role of critical thinking in science education. *Online Submission*, 8(20), 160-173.
 [5] Sari, M. M., & Muchlis, M. (2022). Improving critical thinking skills of high school students through guided inquiry implementation for learning reaction rate concept in chemistry. *Jurnal Pijar Mipa*, 17(2), 169-174.
 [6] Norrizqa, H. (2016). Berpikir Kritis dalam Pembelajaran IPA. *Prosiding Seminar*

- Nasional Pendidikan IPA*. Penerbit; S2 IPA UNLAM PRESS, Oktober 2016.
- [7] Kementerian Pendidikan dan Kebudayaan. (2017). *Model Silabus Mata Pelajaran Sekolah Menengah Pertama/Madrasah Tsanawiyah (SMP/MTs)*. Jakarta: Kemendikbud.
- [8] Hidayah, N., Muhlis., & Artayasa, I. P. (2021). Pengembangan Bahan Ajar Jaringan Tumbuhan Berbasis *Discovery Learning* Siswa Kelas XI SMA. *Jurnal Pijar MIPA*, (3)16. 358-365.
- [9] Sutoyo dan Priantari, I. (2019). Discovery Learning Meningkatkan Kemampuan Berpikir Kritis Siswa. *Jurnal Biologi dan Pembelajaran Biologi*, 1(4), 31-45.
- [10] Zakrah, Z., Lestari, N., & Kusmiyati. (2015). Pengaruh Strategi Pembelajaran *Discovery Learning* Terhadap Kemampuan Berpikir Kritis Siswa pada Mata Pelajaran IPA Kelas VIII Di SMN 3 Gunungsari Tahun Ajaran 2015/2015. *Jurnal Pijar MIPA*, (1)10, 57-64.
- [11] Amiroh. (2019). *Mahir Membuat Media Interaktif Storyline*. Pustaka Ananda Surva, Yogyakarta.
- [12] Nurfajriani, H. S., & Halimah, N. (2021). Pengaruh Multimedia Articulate Storyline Berbasis *Discovery Learning* Terhadap Kemampuan Berpikir Kreatif pada Materi Laju Reaksi. *Prosiding Seminar Nasional Kimia Berwawasan Lingkungan*, Medan, 75-80.
- [13] Wulandari, E.,Suryanti., & Sudibyoy, E. (2020). Pengembangan Bahan Ajar Berbasis Inquiri Berbantuan Multimedia Interaktif untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Sekolah Dasar. *Jurnal Education and Development*, 3(8), 101-105.
- [14] Sugiarti, & Bija, S. (2012). Pengaruh Model Pembelajaran Kontekstual Terhadap Kemampuan Berpikir Kritis Siswa Kelas XI IA SMA Negeri 3 Watinsoppeng. *Jurnal Chemica*, 1(13), 77-83.
- [15] Vincent-Lancrin, S., González-Sancho, C., Bouckaert, M., de Luca, F., Fernández-Barrerra, M., Jacotin, G., ... & Vidal, Q. (2019). *Fostering Students' Creativity and Critical Thinking: What It Means in School*. Educational Research and Innovation. OECD Publishing. 2, rue Andre Pascal, F-75775 Paris Cedex 16, France.
- [16] Putri, E. J., & Yerimadesi, Y. (2022). Effectivity of guided discovery learning supported with elemental chemistry e-module on students learning outcomes. *Jurnal Pijar Mipa*, 17(3), 375-379.
- [17] Septiani, A., Suganda, V, N. (2021). Kesesuaian Materi Pembelajaran dengan Kompetensi Dasar pada Buku Tematik Tema 3 Kelas IV Sekolah Dasat Edisi Revisi 2017. *Jurnal Inovasi Sekolah Dasar*, 1(8), 40-47.
- [18] Dafrita, I. E. (2017). Pengaruh *Discovery Learning* Terhadap Kemampuan Berpikir Kritis dan Analitis dalam Menemukan Konsep Keanekaragaman Tumbuhan. *Jurnal Pendidikan Informatika dan Sains*, 1(6), 32-46.
- [19] Gumelar, R. G. (2014). Layout Majalah Sebagai Sebuah Cerminan Identitas Pembaca Studi Kasus Layout Majalah *Cosmopolitan* dan *Aneka Yes*. *Jurnal Komunikasi*, 3(2), 51-57.
- [20] Wicaksono, L. (2016). Bahasa dalam Komunikasi Pembelajaran. *Jurnal Pembelajaran Prospektif*, 2(1), 9-19.
- [21] Aziz, A. L., Musadieg, M.A., & Susilo, H. (2013). Pengaruh Kemudahan Penggunaan Terhadap Kemanfaatan pada Sikap Pengguna E-Learning. *Jurnal Administrasi Binis*, 2(6), 1-7.