AMPLITUDO 2(1) (2023)

AMPLITUDO: Journal of Science & Technology Innovation

https://journals.balaipublikasi.id

Development of Physics E-Learning with *Articulate Storyline* Application to Improve Science Process Skills

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Received: October 22, 2022
Revised: February 18, 2023
Accepted: February 26, 2023
Published: February 28, 2023

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DOI: 10.56566/amplitudo.v2i1.86

Abstract: This research aims to develop physics e-learning with articulate storyline applications to improve science process skills. Researchis research and development. Development methods are 4D models with stages of define, design, development, and dissemination. The object of research is problem-based physics e-learning media with articulate storyline applications on straight-motion material. The test subjects were 20 students of grade X SMAN 1 Sikur. Data analysis techniques use qualitative and quantitative data analysis. The results of the study can be concluded that physics e-learning products with articulate storyline applications on straight-motion material are categorized as valid with an average score of 3.58, and physics e-learning is quite effective to be used to improve students' science process skills with a percentage of N-gain 58.13% with sufficient criteria effective.

Keywords: E-Learning; Articulate Storyline; Process Science Skills

Introduction

The 21st century has entered the industrial revolution 4.0 is an era of change through technological complaints in various sectors, one of which is the education sector (Novitasari *et al*., 2023). The 21 st century is an era of globalization marked by the development of technology, communication and information. This era of globalization also has an impact in various fields, including education. Education has a very important role in helping a person have skills in using technology, communication and information media. The influence of technology in the field of education, one example is e-learning.

E-learning is learning that utilizes the support of internet technology (Suartama, 2014). E-learning can be understood as a learning process that utilizes information technology in the form of computers equipped with telecommunication facilities (internet, intranet, extranet) and multimedia (graphics, audio, video) as the main media in delivering material and creating interaction between teachers and learners (Chandrawati, 2010). Electronic learning or e-learning has begun in the 1970 (Waller and Wilson, 2001). Various terms are used to express opinions/ideas about electronic learning, including: online learning, internet enabled learning, virtual learning, or web-based learning. E-learning is a learning media based on information and communication and its use is still not widely developed and utilized in Indonesia (Chusna, 2019).

The *Covid-19* endemic has caused schools in various places to carry out off line or online learning activities. Based on observations to SMAN 1 Sikur, learning activities during the *Covid-19* pandemic were a combination of online and offline. In offline learning, students are only focused on measuring cognitive and affective aspects, while psychomotor aspects are ignored. This is because the learning time in class is limited. In fact, experimentation is one of the most important learning activities because through experimentation learners can directly see how a phenomenon occurs. According to Supardiyono (2009) stated that learning with experimental methods can help students practice improving the performance ability of science process skills. The application ofscience process skills includes the skills to formulate problems, formulate hypotheses, determine variables, prepare tools, assemble tools, use measuring instruments, write data, analyze data, conclude data and communicate

How to Cite:
Sutrio, S., Gunada, I. W., & Sumaeni, B. (2022). Development of Physics E-Learning with Articulate Storyline Application to Improve Science Process Skills. *AMPLITUDO: Journal of Science and Technology Innovation*, 2(1), 48–55. https://doi.org/10.56566/amplitudo.v2i1.86

experimental results (Supardiyono, 2009). Science process skills can be implemented on physics subjects. Physics is one part of science that consists of a set of knowledge, ways of thinking, and processes of inquiry. The process of investigation in physics is usually carried out in the laboratory and in the open, not only that along with the development of laboratory technology has now been developed in virtual form. Virtual laboratory is interactive multimedia to stimulate practicum activities in a computer with the help of the internet to operate it. Virtual laboratories can be an alternative when conditions like now, namely the *Covid-19* pandemic, which does not allow direct experiments. According to research that has been conducted with the use of virtual laboratories, namely research conducted by Gunawan *et al*., (2013), states that the generic science skills of students who get learning treatment with virtual laboratories are higher than students who are taught conventionally. In addition, according to Conway-Klaassen *et al*., (2012), in his research using online learning and virtual labs found that learners who learned virtually showed better performance compared to receiving traditional treatment.

E-learning-based learning is needed along with technological developments. Mastery of learning technology must be mastered by a teacher. Guru is required to be able to master various technologies, especially those related to the world of education. Teachers must be creative in designing learning media so that information or learning materials are conveyed well to students, even though learning takes place online. Online learning processes that are carried out virtually cause less interaction between teachers and students, causing students to be more passive. *Online* class *platforms* that are often used in learning are *e-learning* consisting of *Google Classroom, Zoom, WhatApps,* and other applications. Through this *platform*, teachers and students can communicate virtually. However, because the learning process is carried out virtually, the interaction between teachers and students is less than optimal. To overcome this, it is necessary to develop learning media that can increase the activeness of students in the online learning process. The learning media in question is media using *storyline applications* combined with problem-based learning models. The problem-based learning model is learning that involves students actively so that they can develop scientific attitudes through science process skills. The problem-based learning model focuses more on solving problems by developing scientific solutions and getting ideas or information so that it can bring out the thinking, science skills, and attitudes of students (Arends, 2013). The use of problem-based learning models is expected to increase the activeness of students in the virtual learning process and canimprove science process skills.

Learning media developed using *articulate storyline* applications. Articulate storyline is used in presenting information with a specific purpose (Pratama, 2019). Articulate Storyline will be able to help students more easily understand the material, especially those that are abstract (Wijayanti & Prayitno, 2021). Articulate Storyline is a software that can be used to create presentations, has the same function as author storyline, with several advantages so that it can produce more comprehensive and creative presentations equipped with features such as timeline, movie, picture, character and others. Articulate storyline serves to help create interactive learning media. This media also provides several templates that can be used to create interactive media, especially making practice questions and test questions (Darnawati et.al., 2019). Articulate storyline is one of the multimedia authoring tools used to create interactive learning media with content in the form of a combination of images, text, sound, grafic, video, and animation (Dani & Arief, 2022). This learning media is supported by these features to support the creation of interesting learning media, besides being supported by interesting features, this media is also easy to operate and can be combined with audio, video and so on (Nurmala *et al*., 2021). In addition, the use of learning media using articulate storyline applications in physics subjects can help the smoothness, effectiveness, and efficiency of achieving learning objectives (Limbong & Simarmata, 2020).

Based on this description, problem-based physics e-learning media was developed with articulate storyline applications to improve science process skills. This e-learning media utilizes articulate storyline applications and virtual laboratory development using html and *Javascript* programs developed from pre-existing software, but this *software only* presents virtual laboratories so that in this development researchers add materials, learning videos and learning evaluations into *Softwere* so that a complex e-learning is produced. The material used in this development is class X science physics, material namely straight motion material.

This E-learning media uses a problem-based model to form students who are able to solve problems in physics learning through scientific action so that students' science process skills can be improved. According to Yuliati (2016) stated that the improvement of science process skills of students who get problem-based learning (PBM) is better than students who get non-PBM. The use of problem-based physics e-learning media with articulate storyline applications can support learning activities in the pandemic because in this e-learning media learning materials are presented, learning videos, virtual simulations, and evaluation tools. The development of physics learning media with *articulate storyline* applications aims to make students and teachers become skilled in using and utilizing information technology in the field of education.

Method

The research method used in this research is R&D (Research and Development) or the type of research and development. According to Sugiyono (2019), research and development methods are methods used to produce certain products, and test the effectiveness of these products. This research design uses a 4D development model which is an extension of Define, Design, Development, and Dissemination. First (define): front and analysis, learner analysis, task analysis, concept analysis, and specifying instructional objectives. Second (design): compile criteria tests, choose appropriate learning media, choose the appropriate form of presentation, simulate the presentation of material. Third (develop): validate product feasibility and test the product on real subject matter, to determine the effectiveness of the product. Fourth (disseminate): socialization of products through distribution in limited quantities.

The object of this study is problem-based physics e-learning media with application articulate storyline at straight-motion material. The test project to determine the effectiveness of the product was 20 students of grade X SMAN 1 Sikur. Data analysis techniques use qualitative and quantitative data analysis. Qualitative data in this study is in the form of suggestions and comments from validators on the feasibility assessment worksheet. Mean while, quantitative data is obtained from the results of validation questionnaires assessed by validators and data on the results of science process skills. Analysis of product effectiveness is based on learners' achievement in completing science process skills tests. The improvement of science process skills can be determined using the *N-gain* (Normalized Gain) test. The result of the *N-gain* value is interpreted according to the criteria in Table 1.

Table 1. N-Gain Criteria

Value <g>	Criterion
≥ 0.76	Effective
56-75	Quite Effective
40-55	Less Effective
<40	Ineffective

(Solikha, 2020)

Result and Discussion

First (define), the define stage includes several stages, namely: a) **Front and analysis**, at this stage carry out initial diagnosis so that learning can be carried out effectively. Data obtained from observation and interviews with teachers at SMAN 1 Sikur found that the curriculum used was the 2013 curriculum. Learning effectiveness can be done by developing e-learning. The 2013 curriculum requires teachers to make students more dominant in learning activities so that students become more active. Therefore, it is necessary to design problem-oriented learning, containing practicums, lectures, discussions, questions and answers and utilizing interesting learning media. b) **Learner analysis**, this activity analyzes the characteristics of students of SMAN 1 Sikur class X MIPA for the 2021/2022 academic year. The result is that the ability of students' science process skills has never been measured in learning activities. c) **Task analysis**, analyzing the main tasks that must be mastered by students so that students can achieve minimum competence. The knowledge gained is based on scientific work. Scientific work is based on knowledge in measuring scientific process skills, including observing, using numbers, formulating hypotheses, experiments, interpreting / interpreting data, predicting/predicting, applying concepts, and communicating. d) **Concept analysis**, analyze the concepts to be taught related to straight motion material. e)**Specifying instructional** objectives, learning objectives related to the concept of motion include: m explain the concept of objects that move straight, m know the characteristics of objects that move straight at a constant speed, mFind out the characteristics of objects that move straight with constant acceleration, develop between straight motion with constant speed and straight motion with constant acceleration, make tables and graphs of straight motion with constant speed from the experimental results using simulation virtually, and make tables and graphs of straight motion with constant acceleration from the experimental results using simulation virtually.

Second (design), at this stage, problem-based physics e-learning is designed with the application of *articulate storyline 3* to improve the science process skills of learners. In addition, at this stage, learning materials will be determined to be used in virtual laboratory simulations. The steps for making physics e-learning products include:

1) Install the articulate storyline 3 application

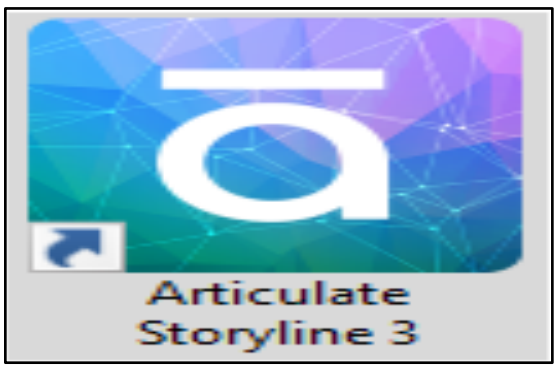

Figure 1. Application articulate storyline 3

2) Open the articulate storyline 3 application.

The initial view of the articulate storyline 3 application as shown below there are several menus for creating and editing projects.

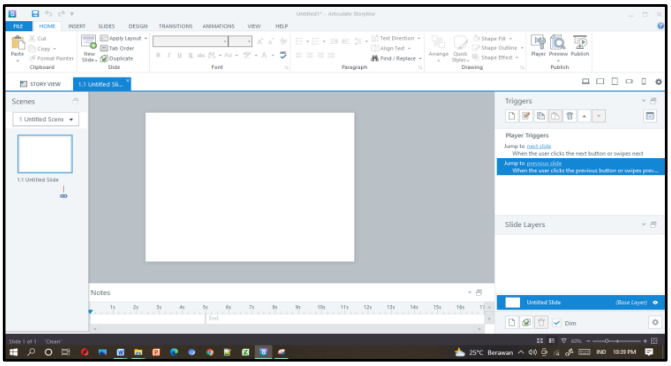

Figure 2. Initial view of articulate storyline 3 application

3) Define storysize

Specify the storysize in the design section then select size 16:9. The canvas size is adjusted according to needs.

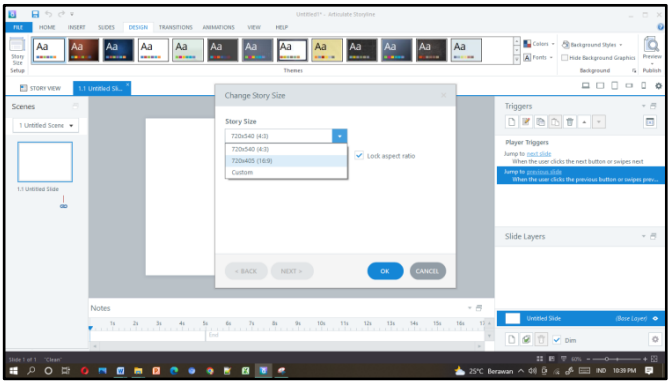

Figure 3. Initial view of define storysize

4) Create multiple scenes by clicking the home section, and then clicking *new scene.*

To make it easier to distinguish the contents of each scene, it can be changed the title of each scene that has been created by double-clicking the text *untitled scene,* such as the display of Figure 4.

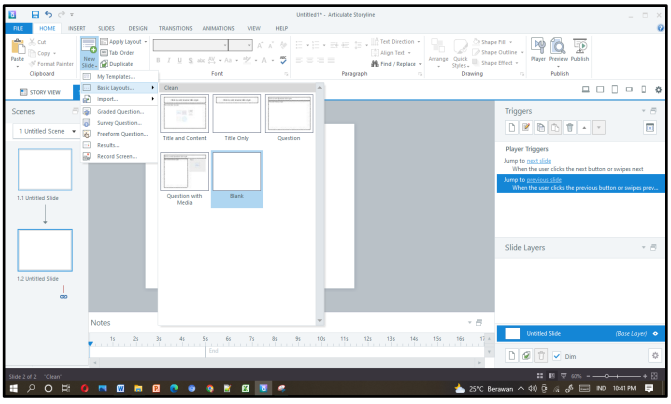

Figure 4. Display of multiple scenes in articulate storyline 3

5) Enter the contents of each predefined scene

The opening of *e-learning* is in the first scene. To change the background, you can use the *insert* menu then select *picture* and inport the image from the folder on the computer or laptop then select *open*. The image will automatically become the background at the beginning or opening of physics e-learning. Next to create a title select the insert menu then select the text box after that type the e-learning title, the title is placed on the whiteboard image. For moving animations and images in the opening section of e-learning are added using the *insert* menu then select *picture* and inport the image from the folder on the computer or laptop then select *open* adjust the location of the images and animations to make them look attractive, as shown in Figure 5. Next, to move the opening scene to the scene, instructions for using *e-learning* made a button by using select the *insert* menu and select *shape*, select the box and enter the word "instructions for use " So that the button created can work, click 2 times the instructions for use button and it will appear to the right of the *triggers* function that functions to activate the button. Select jump to next slide to move to the next slide, as Figure 5 shows.

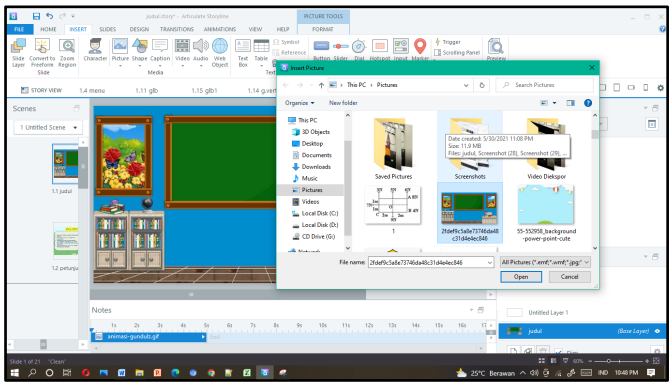

Figure 5. Enter the content of each scene in the articulate storyline 3 application

6) The stage of making a demonstration of the use of e-learning

At the stage of demonstrating the use of e-learning, there are several steps taken, including: a) take background first in the same way as the first step in the opening section of e-learning; b) show the use of e-learning; c) use the shape function as a place for explanation of how to use physics e-learning; d) there are 4 shapes used, the first shape for the title slide, the second and third *shapes* for an explanation of the use of e-learning and the fourth *shape* for button functions; e) there is a start button click 2 times to activate and in the *triggers* section select jump to next slide ; and f) start button will move to slide to fill in student biodata. As shown in Figure 6 and Figure 7.

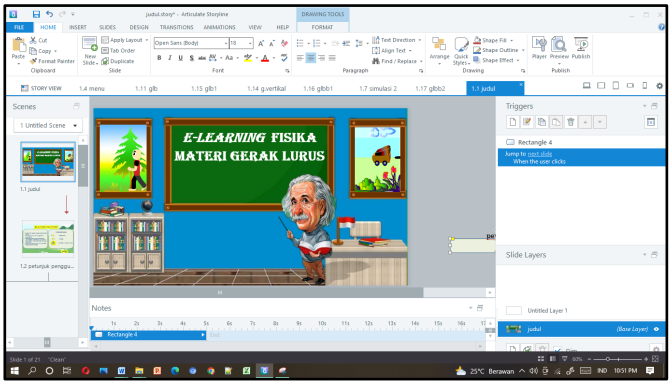

Figure 6. Display of straight-motion material physics e-learning in articulate storyline 3 application

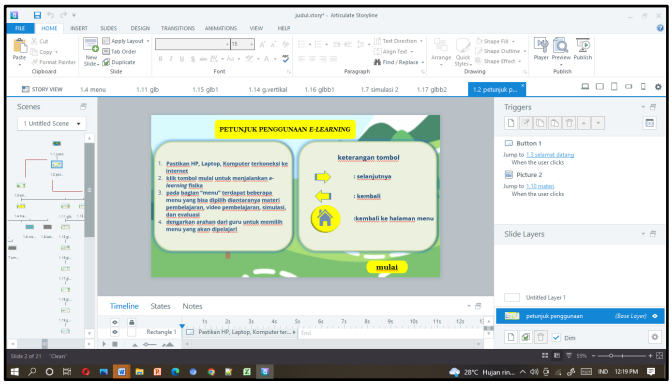

Figure 7. Display instructions for using e-learning

7) Filling in student identity

Using *shapes* to fill in student identities, place *shapes* in the middle of the slide. Add text with text *box* function. The next step, enter the name and class using the *text entry* function so that when the application is run students can enter the name and class. Then create the next button to move to the next slide.

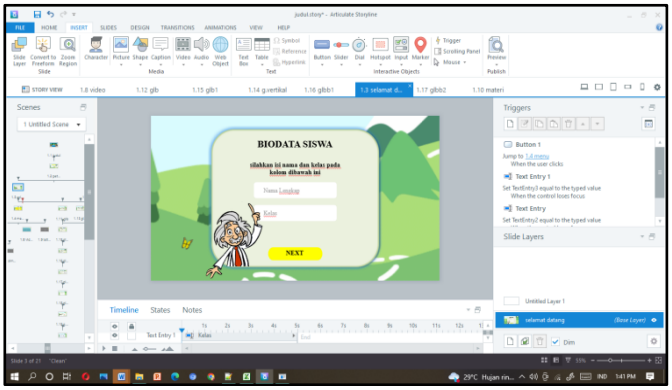

Figure 8. Display of student identity filling in e-learning

8) *E*-Learning Menu

In the *e-learning* menu there are 5 *shapes*, where the first shape is for the menu title, the second shape is for learning materials, the third shape is for learning videos, the fourth shape is for simulation, and the fifth *shape* is for learning evaluation.

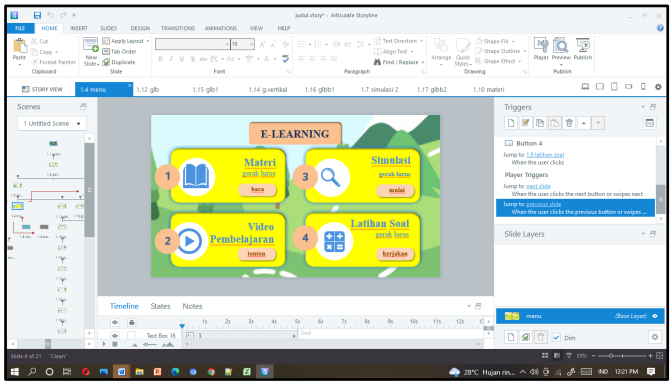

Figure 9. Physics-based e-learning menu display with articulate storyline 3 application

Third (development), this stage contains activities to test product validity and test products on the real target subject. The development stage is the stage to produce problem-based physics e-learning products using *articulate storyline 3* applications. The development stage is carried out with 2 testing steps, namely product validity tests by expert validators and practitioner validators, after that the trial is limited to 20 students of grade X SMAN 1 Sikur to determine the effectiveness of physics e-learning.

The product validity test was carried out by 3 expert validators from lecturers of the Physics Education Study Program FKIP Mataram University. In addition, the products that have been developed are also tested for validity by 3 practitioner validators from the physics teacher of SMAN 1 Sikur. The product that has been developed is then validatedby validators and revised based on suggestions and input received. If a product that has been validated by validators shows valid results, it is generally said to be suitable for use in the learning process. Based on the results of the analysis conducted on problem-based physics *e-learning*, the average score by expert validators was 3.63 with valid criteria, while the average score by practitioner validators was 3.53 with valid criteria. Details of the assessment of each component provided by expert validators and practitioner validators can be seen in Table 2. The validity category is based on an average score of $3.26 < \bar{x} \leq 4.00$ (valid), $2.51 < \bar{x} \leq 3.26$ (quite valid), $1.76 < \bar{x} \leq 2.51$ (less valid), and $1.00 < \bar{x} \leq 1.75$ (valid) (Maharani et al., 2018)

Table 2. Problem-Based Physics *E-learning* Validation Results

Validators	Average Score	Criterion
Expert	3.63	Valid
Practitioners	3.53	Valid
	3.58	Valid

In addition to providing assessments on *e-learning*, validators also provide suggestions that are further improved by researchers to get better products. The

results of improvements in the evaluation tool can be seen in Table 3.

Table 3. Details of Comments and Fixes *E-learning Problem-Based* Physics

Validators	Commentary	Repair
Expert Validators (code 01)	There are double buttons in e-learning, select one of the buttons	Eliminate the dual buttons on e-learning
Practitioner Validator	Biodata recorded in the teacher/researcher database	Student data automatically enters the teacher/researcher database

After making improvements according to the validator's suggestions, the next stage is to test theeffectiveness of *problem-based physics e-learning*. Before *e-learning* is tested in the learning process, first at the beginning of learning students are given a pretest with science process skills instruments and at the end of the trial is given a posttest. The data obtained from the pretest and postest results are used to determine the effectiveness of physics *e-learning* developedin an effort to improve the science process skills of learners. The data analysis to determine the effectiveness of *e-learning* uses *N-Gain* analysis. *N-Gain* is intended to determine the improvement of students' science process skills after participating in learning activities on straight-motion material. The average *N-Gain* obtained by all students can be seen in Table 4.

Table 4. Average N-Gain Science Process Skills Test

$\bar{X}$ pretest	$\bar{X}$ posttes	$\bar{X}posttest - \bar{X}pretest$	$Xmax - \bar{X}pret$	N-Gain (%)	Criterion
27.75	69.75	42	72.25	58.13	Quite Effective

In Table 4. It is known that the percentage of improvement in students' science process skills in 20 students of SMAN 1 Sikur using *N-Gain* analysis was 58.13% with quite effective criteria.

Fourth (disseminate), this stage is the final stage of development research. At this stage, researchers disseminate research results in the form of time-based physics e-learning products with articulate storyline 3 applications to physics teachers at SMA Negeri 1 Sikur and several students to be used in the learning process. Overall, the results showed that problem-based physics *e-learning* with articulate storyline 3 applications was categorized as valid and effective for improving students' science process skills.

Discussion

E-learning is aninternet-based learning theme. E-learning can be used as a learning medium for high school students (Muliyati et al., 2019). *E-learning* developed in this study is in the form of a web application made by utilizing articulate storyline 3 programs, html, and *Javascript* to create experimental simulations in the form of virtual laboratories. This *e-learning* consists of learning materials, learning videos, virtual simulations, and learning evaluations. Thevalidity of problem-based physics *e-learning* with articulate storyline 3 applications is assessed by expert validators and practitioner validators. The average score of validation results from expert validators is 3.63 is categorized as valid and from practitioner validators which is 3.53 is categorized as valid. Every aspect assessed in the development of physics *e-learning* has valid categories. In addition to conducting assessments, validators also provide suggestions or comments as material for improvement. Overall, problem-based physics *e-learning* is valid or feasible to be used to improve students' science process skills. The definition used is articulate storyline 3. Learning media based on articulate storyline is very suitable to be used as a learning media. This is supported based on research conducted by Hadza et al., (2020), that learning media that have been developed using articulate storyline obtained an average of 86.16% in the very good category. In addition, the results of Dani & Arief (2022) research revealed that there was an increase in student learning outcomes after applying the multimedia-based learning process of class X MIA 1 articulate storyline on momentum and impulse material.

The effectiveness of *physics e-learning* with the application of articulate storyline 3 on straight-motion material that has been developed can improve students' science process skills. Hasil *pretest* and *posttest* learners who are then analyzed using the N-Gain test. The implementation of learning activities was carried out as many as 3 meetings in class X of SMAN 1 Sikur. Before the learning activity started, the researcher gave a pretest with 20 multiple-choice questions with a processing time of 60 minutes, after carrying out 3 learning meetings, the researcher gave a posttest with 20 multiple-choice questions with a processing time of 60 minutes. The results of the analysis of the value of students' science process skills obtained an average *pretest* score of 27.75, these results showed that students' science process skills were low. Students have not been able to solve the phenomena related to straight motion given by researchers. After learning activities were carried out with physics e-learning media with the application of articulate storyline 3 on straight motion material, the average *posttest* score of 69.75 was obtained. After being analyzed with the N-Gain test, the average effectiveness value obtained was 58.13% with quite effective criteria. This is also in line with research conducted by Bakri and Mulyati (2017), namely the results of formative evaluation in the form of feasibility tests on the *resulting e-learning* devices obtained that the devices can be declared suitable for use in physics learning.

Conclusion

Physics *e-learning* with articulate storyline applications on straight motion material is categorized as valid based on the results of expert and practitioner validation with an average score of 3.58. *Physics E-learning* media is quite effective to use with the improvement of students' science process skills with an N-Gain percentage of 58.13% criteria is quite effective.

Acknowledgements

The author would like to thank SMAN 1 Sikur and all validators who have helped in this research process.

References

Arends, R. (2013). *Learn to Teach*. Jakarta: Salemba Humanika

Bakri, F., &; Mulyati, D. (2017). Development of *e-learning* tools for Basic Physics II using LMS Chamilo. *Journal of physics education vehicles*. 2(1), 25-30.

Chandrawati, S. R. (2010). Utilization of E-learning in Learning. *Journal of Educational Horizons*, 8(2). 172-181. Retrieved from https://jurnal.untan.ac.id/index.php/jckrw/article/view/183

Chusna, N. L. (2019). E-learning Learning. *In Proceedings of the National Seminar on Education KALUNI. 2(1)*. 113-117. http://dx.doi.org/10.30998/prokaluni.v2i0.36

Conway-Klaassen, J. M., Wiesner, S. M., Desens, C., Trcka, P., &; Swinehart, C. (2012). Using online instruction and virtual laboratories to teach hemostasis in a medical laboratory science program. American Society for Clinical Laboratory Science, 25(4), 224-229. https://doi.org/10.29074/ascls.25.4.224

Dani, A. U., &; Arief, S. (2022). The influence of the use of multimedia articulate storyline on the physics learning outcomes of students. *JPF (Journal of Physics Education) Alauddin State Islamic University Makassar*, *10*(2), 216-221. https://journal3.uin-alauddin.ac.id/index.php/PendidikanFisika/article/view/19363

Darnawati, D., Jamiludin, J., Batia, L., Irawaty, I., and Salim, S. (2019). Teacher empowerment through the development of interactive learning multimedia with articulate storyline applications. Scientific Charity: *Journal of Community Service*. 1(1), 8-16. https://ojs.uho.ac.id/index.php/amalilmiah/article/view/8780

Gunawan., Setiawan. A, & Widyantoro D.H. (2013). Virtual Laboratory Model of Modern Physics to Improve Generic Science Skills of Teacher Candidates. *Journal of Education and Learning*. 20(1), 25-32. http://journal.um.ac.id/index.php/pendidikan-dan-pembelajaran/article/view/3867

Hadza, C., Sesrita, A., &; Suherman, I. (2020). Development of Learning Media Based on Articulate Storyline. Indonesian Journal of Applied Research (IJAR), 1(2), 80-85. https://iojs.unida.ac.id/index.php/IJAR/article/view/54

Limbong, T., &; Simarmata, J. (2020). *Media and Multimedia Learning*: Theory & Practice. Our Foundation Writes.

Maharani, M., Supriadi, N., &; Widiyastuti, R. (2018). Cartoon-based mathematics learning media to reduce student anxiety. *Decimal: Journal of Mathematics*, 1(1), 101-106. http://ejournal.radenintan.ac.id/index.php/desimal/article/view/2036#

Muliyati, D., Marizka, H., &; Bakri, F. (2019). E-learning using wordpress on physics materials with the 5E learning cycle strategy. *Journal of Physics Education Research & Development*, *5*(2), 101-112. http://journal.unj.ac.id/unj/index.php/jpppf/article/view/12342

Novitasari, D., Wibowo, F. C., &; Raihanati, R. (2023, January). Articulate Storyline-assisted STEM-based Fluid Android (ADRODA) app. In *Proceedings of the National Seminar on Physics (E-JOURNAL)* 11(1). https://journal.unj.ac.id/unj/index.php/prosidingsnf/article/view/33683/14715

Nurmala, S., Triwoelandari, R., &; Fahri, M. (2021). Development of articulate storyline 3 media in STEM-based science learning to develop the creativity of elementary / MI students. *Basicedu Journal*, 5(6), 5024-5034. https://jbasic.org/index.php/basicedu/article/view/1546/pdf.

Primary, R. A. (2019). Learning media based on Articulate Storyline 2 on Drawing Function Graphs at SMP Patra Dharma 2 Balikpapan. *Journal of Dimensions*, 7(1), 19–35. https://Doi.Org/10.33373/Dms.V7i1.1631

Solikha, Nikmatus., Suchainah., &; Rashida, Irfah. (2020). The Effectiveness of Schoology-Based E-learning Learning on Improving Student Effectiveness and Learning Outcomes. *Journal of Ilmia, Education & Social*. 11(1), 31-42.

Suartama, I. K. (2014). *E-learning: Concepts and Applications*. Ganesha University of Education. Singaraja.

Supardiyono. (2009). *Implementation of Experimental Methods in Physics Learning in Junior High School*. Faculty of Mathematics and Natural Sciences, Yogyakarta State University. Yogyakarta.

Yuliati, Y. (2016). Improvement of Science Process Skills of Elementary School Students through Problem-Based Learning Model. *Journal of Cakrawala Pendas*.

2(2), 71-83. https://unma.ac.id/jurnal/index.php/CP/article/view/335

Waller, V. & Wilson, J. 2001. *A definition for e-learning*. TheODL QC Newsletter, pp. 1-2.

Wijayanti, W., &; Prayitno, T. A. (2021, November). Development of interactive multimedia based on articulate storyline as a learning medium for grade X high school students. *In Proceedings of IKIP Budi Utomo National Seminar*. 2(1). 515-522. http://ejurnal.budiutomomalang.ac.id/index.php/prosiding/article/view/1475