



Development Artsteps Learning Media Using Songs on the Topic of Animal Life Cycle

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Abstract: The inequality of student learning outcomes in the science and science content on animal life cycles and the learning media used by teachers in schools is still not optimal. Thus, interactive media is needed so that learning can run optimally, namely Artsteps using songs. This research aims to develop, and test the feasibility and the effectiveness of Artsteps learning media using songs in improving learning outcomes on animal life cycle for class IV. This type of research is Research and Development (R&D) which uses the Borg and Gall development model. The result of this research is the process of developing song-assisted Artsteps as a learning medium on animal life cycle material; the feasibility of song-assisted Artsteps which is considered very valid by experts with an average validation value of 91%; student responses to song-assisted Artsteps were very valid with a percentage of 95%; The results of the t-test show a sig (2-tailed) value of $0.000 < 0.05$ and it is stated that there is a difference in the average results before treatment and in the limited test and extensive test, so it can be concluded that Artsteps using songs can improve learning outcomes on animal life cycle.

Keywords: Animal life cycle; Artsteps; Learning media; Learning outcomes

Introduction

In the school learning process, some students may inevitably face learning difficulties. To facilitate students' understanding of the material concepts during the learning process, creative teaching methods are needed to bring joy and high enthusiasm to each student (Taqiyyah, 2023). Especially in today's era, where children are familiar with and frequently use technology such as smartphones, technology is no longer unfamiliar. To enhance students' interest and enthusiasm for learning, it is essential to create a pleasant, creative, and innovative learning atmosphere, which can be achieved through instructional media (Suryadi et al., 2022).

Learning media is a tool or device used in the educational process that enables educators and students to engage in learning activities (Widianto, 2021). Media

use in education can generate new interest, enhance motivation and stimulation in learning activities, and even psychologically affect children (Lovandri et al., 2015). Furthermore, instructional media can explore delivering educational messages to stimulate students' minds, feelings, and emotions. Meanwhile, media is inseparable from digital technology, which can provide a more interactive and engaging learning experience for students (Agustina et al., 2023).

Learning media in education involves understanding the importance of digital technology in education (Iasha et al., 2019). The significance of technology-based learning resources in education lies in their capacity to streamline the absorption of delivered learning content and facilitate the attainment of educational goals. This is attributed to their ability to enhance student motivation, thereby fostering mastery of learning objectives (Puspitarini et al., 2019).

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However, up to now, most teachers still use textbooks as their learning media because they are considered more practical and easy to carry. Even though the textbooks teachers use still have many shortcomings, because the existing material is sometimes inadequate, teachers have to look for reinforcement of other materials. Of course, with developments in science and technology, we need to add media that can help teachers' efforts to improve student learning outcomes (Miaz et al., 2019). During the learning process, the media used must also be effective (Henrietta et al., 2017; Palieraki et al., 2021).

The learning media can be simple and take a short time to create. However, making good and correct media requires concepts and theories that are truly mature, structured, and not haphazard (Delima et al., 2022). In the teaching and learning process, a teacher should be skilled in selecting, using, and adapting the media used (Karo-Karo et al., 2018). Employing appropriate learning media will evoke enthusiasm and increase student engagement throughout the learning process (Dewi, 2021).

The lack of learning media that accommodates students' needs and can significantly improve student learning outcomes is the main reason for the problems studied. Students are not performing at their best in comprehending school-provided learning materials due to suboptimal utilization of media resources (Kusnulyaningsih et al., 2022).

To improve student learning outcomes, researchers decided to develop song media. Students' moods and concentration in receiving learning can be improved through the learning process using song media (Azis et al., 2020; Wahyu et al., 2023). Therefore, lessons will not be hampered because it has been proven that the sound of songs influences the atmosphere and eliminates feelings of tension in learning, making the learning process more enjoyable for students (Prananda et al., 2023). The solution to creating variations in learning is with the song media that has been developed. Therefore, the researchers developed pre-existing children's songs, then the original song lyrics of the children's songs were replaced and created by adapting them to the learning material (Arief et al., 2020).

Researchers also make animated videos containing previously created songs to increase students' interest in learning, which can help convey learning concepts in an exciting and easy-to-understand way (Sari, 2018). Combining songs and animated videos can make it easier to understand the material because children's songs often have melodies that are easy for students to remember (Simbolon et al., 2023). With animated videos, students tend to be more responsive to creative elements such as colors, animated characters, and songs (Astuti et al., 2021).

To optimize the development of song media, researchers involved technology called Artsteps. Artsteps is a site that provides 3D virtual gallery space to create art galleries that can be explored (Dumitrescu et al., 2014; Herliyani et al., 2022). This site was chosen because it can provide a fun learning experience and stimulate the implementation of self-motivated learning (Wahyu et al., 2023). In this research and development, the Artsteps site functions as a forum for describing songs to make their delivery more precise. This site can also create fun learning situations using various techniques, including game-based learning, simulation-based learning, and virtual 3D worlds (Cruz et al., 2022; Wahyu et al., 2023). In this research and development, the Artsteps site functions as a forum for describing songs to clarify their delivery. Students can understand the singing process because the lyrics include the material (Nurajizah, 2016).

Based on the results of observations and interviews with the class IV homeroom teacher at Sampangan 02 National Primary School Semarang City, it is known that the implementation of independent curriculum learning in science and science content in class IV still needs to be improved, especially in the animal life cycle material. Teaching materials are available, but students still need more understanding. Learning science and technology content in Class IV of Sampangan 02 National Primary School Semarang City still follows conventional learning patterns. The methods used are assignment methods, group discussions, experiments, and lectures. The learning media used is limited to a whiteboard as a medium for taking notes. As a result, students tend to be passive, with low learning outcomes. The material in the available LKS is not by core competencies. This makes students uninterested in reading because the teaching materials are limited and less attractive (Wati et al., 2022).

It is known that the material on animal life cycles is still complex for students to understand because it has yet to be taught optimally with minimal media such as books, YouTube, and only pictures; there is no IT-based media that can make children enthusiastic (Alfatonah et al., 2023; Handayani et al., 2022).

Animal life cycle material can be taught optimally if the teacher provides engaging media (Izhar et al., 2023). Improving the quality of science and science learning requires innovations, including selecting learning methods, models, and media (Widyaningrum et al., 2022). For this reason, researchers created IT-based media, namely Artsteps, with the help of songs because, on this platform, there are songs with lyrics that match the animal life cycle material. Students will slowly understand and easily remember the animal life cycle material by singing the song (Safitri, 2022).

Based on the results of the literature review, digital applications that have often been used for learning animal life cycle material are E-Comics (Kadek et al., 2021), Website-based (Kamila et al., 2023), Video Storytelling (Yustikadewi, 2023) and Picture card and games (Arisandi et al., 2022). Meanwhile, 3D-based digital learning media in the form of student work exhibitions still needs to be improved in previous research, so it needs to be developed (Setiawan et al., 2022).

Based on the description above, it is necessary to develop novelties. Therefore, the researchers developed IT-based learning media titled "Development Artsteps Learning Media using songs on The Topic Animal Life Cycle." Researchers have relevance to the problems faced, namely the low student learning outcomes in science content, especially in animal life cycle material in class IV, and the lack of provision of interactive learning media. Thus, it is hoped that this research can resolve this problem, especially regarding student learning outcomes.

Method

The approach employed in this study is a form of research and development commonly known as Research and Development (R&D), aimed at generating learning media products. The author adopts a research framework derived from the development research model (R&D), drawing from the Borg and Gall model modified by Sugiyono. The utilization of song-assisted Arsteps learning media aligns with the Borg & Gall development model, which comprises ten stages: identification of potential and problems, gathering of data, product design, validation of design, revision of design, testing of the product, product revision, trial usage, final revision, and mass production (Aka et al., 2019; Sugiyono, 2017).

The research subjects for the small-scale product trials were six students selected using a purposive sampling technique, while for the large-scale product trials, there were 30 students. The total class IV population is 36 students. The independent variable in this research is song-assisted Arsteps media. The dependent variable is student learning outcomes.

The research methodology involves the creation of song-enhanced Artsteps learning media, with the primary focus on the developmental evaluation process, primarily conducted through teacher feedback assessments, serving as a yardstick for the development's efficacy. Product data analysis encompasses the examination of questionnaires gauging teacher and student requirements alongside assessments of their responses to the media.

Analysis of the Teacher and Student Needs Questionnaire using the Guttman scale with yes or no answer options. The range of scale values used is 1 (yes) and 0 (no). The formula used is as follows Formula 1 (Arikunto, 2013).

$$P = \frac{\sum x}{\sum xi} \times 100 \tag{1}$$

Information:

P = score percentage

$\sum x$ = The count of respondents' responses for a single item.

$\sum xi$ = The count of ideal scores for a single item.

Table 1. Criteria for the Teacher and Student Needs Questionnaire

Percentage (%)	Criteria
81 - 100	Strongly agree
61 - 80	Agree
41 - 60	Disagree less
21 - 40	Disagree
0 - 20	Strongly disagree

Analysis of teacher and student responses to media using the Guttman scale with yes or no answer options. The range of scale values used is 1 (yes) and 0 (no). The formula used is as follows Formula 1 (Arikunto, 2013).

Table 2. Teacher Response Questionnaire Criteria

Percentage (%)	Criteria	Description
81- 100	Excellent	The media is very feasible, it does not need to be revised
61 - 80	Good	Decent media does not need revision
41 - 60	Good Enough	Less decent media needs revision
21 - 40	Not Good	Inappropriate media needs revision
< 20	Very Unfavorable	The media is very unworthy of revision

Table 3. Student Response Questionnaire Criteria

Score Percentage (%)	Criteria
81 - 100	Very interesting
61 - 80	Pull
41 - 60	Quite interesting
21 - 40	Less attractive
0 - 20	Unattractive

The assessment of students' cognitive learning outcomes before and after treatment can gauge the effectiveness of the intervention. This analysis involves evaluating the scores obtained from pre- and post-treatment assessments. Additionally, the normality test employed in this study aims to ascertain whether the data distribution pattern follows a normal distribution

or not (Priyatno, 2018). Conducting normality tests is crucial as data that adheres to a typical distribution pattern indicates its ability to represent the population accurately. In this research, the Shapiro-Wilk normality test in SPSS version 22 was utilized to ascertain if the data followed a normal distribution.

Table 4. Normality Test Testing Criteria (Priyatno, 2018)

Result	Information
If the significance is ≤ 0.05	Ho was rejected
If the significance value > 0.05	Ho accepted

Next, the Paired Samples T-Test or paired-samples t-test was conducted to determine the testing of the average difference between two paired samples. According to Priyatno (2018), paired samples are employed in sample groups comprising the same subjects but experiencing two different treatments, such as before and after treatment. In this study, the researcher utilized SPSS version 22 to test the outcomes before and after treatment using the paired samples t-test. This t-test can be applied to data demonstrating a parametric normal distribution.

Table 5. Criteria for Paired Samples T-Test Testing (Priyatno, 2018)

Result	Explanation
If $-t$ calculate $-t$ table or greater or \geq	Ho accepted
t calculate t table \leq	
If $-t$ calculate $-t$ table less $<$	Ho was rejected
t hitung t tabel $>$	

Table 6. Decision-Making Based on the Significance Level of the Paired Samples T-Test (Priyatno, 2018)

Result	Explanation
If the significance value is ≤ 0.05	Ho accepted
If the significance value > 0.05	Ho was rejected

The analysis continued with gain index analysis, which assessed the evaluation between pretest and posttest scores. In this study, the gain referred to is normalized gain (N-gain). N-Gain is obtained by normalizing the difference between pretest and posttest scores with the difference between the Ideal Minimum Score (SMI) and the pretest score in the IPAS subject after using Artsteps song-assisted learning media. The normalized gain formula is as follows Formula 2 (Lestari et al., 2017).

$$N - Gain = \frac{Posttest\ Score - Pretest\ Score}{Maximal\ Score - Pretest\ Score} \quad (2)$$

Information:

- N-gain = magnitude of gain factor
- Skor posttest = final test score after treatment
- Skor pretest = initial value before treatment

Maximum score= maximum value

Table 7. Test Average N-Gain (Lestari et al., 2017)

Interval	Explanation
$N-Gain \geq 0.7$	Tall
$0.3 \leq N-Gain \leq 0.7$	Keep
$N-Gain < 0.3$	Low

Result and Discussion

This study aims to develop Artsteps learning media assisted by songs in teaching Natural Sciences and Social Sciences, particularly on the life cycle of animals. The research was conducted at SD Negeri Sampangan 02, Semarang City. It encompasses several important aspects evaluated from developing art steps, such as learning media assisted by songs. These aspects include evaluating the results of developing Artsteps assisted by songs, assessing the suitability of using Artsteps assisted by songs as a learning media, and researching the effectiveness of using Artsteps assisted by songs in enhancing student understanding and learning outcomes (Wahyu et al., 2023).

Product Data Analysis

Analysis of the Teacher and Student Needs Questionnaire

Table 8 displays the outcomes of the teacher and student needs questionnaire. It was revealed that the average results of the teacher and student needs questionnaire regarding the development of Art steps learning media aided by songs were 85%, falling under the category of strongly agree.

Table 8. Results of the Teacher and Student Needs Questionnaire

Subject	Percentage (%)
Teacher	89.00
Student	81.00
Average	85.00

Analysis of Teacher and Student Responses to the Media

The result of teacher responses to song-assisted Artsteps on animal life cycle material can be observed through the teacher response questionnaire results. It was discovered that the average teacher's rating for the song-enhanced Artsteps learning media intervention was 94.5%, meeting the criteria of being highly suitable without the need for revisions.

Table 9. Results of the Teacher Response Questionnaire

Subject	Percentage (%)
Class A teacher	89.00
Class B teacher	100.00
Average	94.50

Table 10. Student Response Questionnaire Result

Limites trial results	Results of extensive trials	Average
96%	94%	95%

The result of students' responses to song-assisted Artsteps on animal life cycle material can be observed through the student response questionnaire results. The students' reactions were collected from limited and extensive trial activities. Subsequently, the average student response was calculated based on these questionnaire results. It was found that the average student response was 96% during the initial limited trial and 94% during the broader trial, resulting in a final average student response of 95%, meeting the criteria for being highly exciting. According to the students' response, using Artsteps media song-assisted sparked enthusiasm among them during learning sessions and facilitated a solid understanding of the animal life cycle material.

Initial Data

The normality test is an important step in data analysis to evaluate whether the pretest and posttest data have a normal distribution. Data normality is

crucial because it will influence the choice of appropriate statistical analysis techniques. If the data are normally distributed, researchers will use parametric statistical techniques. Through this normality test, researchers can determine the suitability between the obtained data and the assumptions of the analysis techniques. To conduct the normality test, researchers use the Shapiro-Wilk test formula, which is commonly used, with the assistance of statistical software such as SPSS version 22.

Normality Test

Table 11 shows the results of the normality test in limited trial activities. Based on the output table in the Shapiro-Wilk sig column. For the value before treatment, $0.505 > 0.05$, and the value after treatment, $0.167 > 0.05$. Both values are more significant than 0.05, so it can be concluded that the two values are typically distributed, meeting the prerequisites for conducting the paired sample t-test. Since the normality test indicates that the data follows a normal distribution, the t-test was executed. The t-test outcomes were derived from pretest and post-test data processed using SPSS 22. Below are the results of the t-test conducted during the limited trials

Table 11. Normality Test Results on Limited Trials Test of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Before	0.180	6	0.200*	0.920	6	0.505
After	0.202	6	0.200*	0.853	6	0.167

*. This is a lower bound of the true significance

a. Lilliefors Significance Correction

Table 12. Normality Test Result on Wide Trials Test of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Before	0.151	30	0.080	0.958	30	0.269
After	0.141	30	0.131	0.945	30	0.128

a. Lilliefors significance correction

Table 12 shows the results of the normality test on extensive trial activities. Referring to the Shapiro-Wilk significance column in the output table, the value before treatment is $0.269 > 0.05$, and the value after treatment is $0.128 > 0.05$, both exceeding 0.05. Consequently, these two values adhere to a typical distribution, fulfilling the prerequisites for conducting the paired sample t-test. As the normality test results indicate that the data follows a normal distribution, the t-test can be performed. The t-test outcomes were derived from the data before and after treatment and processed using SPSS 22.

T-Test

Table 13 shows the t-test results on limited trials showing the sig value. (2-tailed) $0.012 < 0.005$, so H_0 is

rejected, and H_a is accepted. It can be concluded that there is a difference in the average results before and after treatment, meaning that the effect of using song-assisted Artsteps on animal life cycle material is found to improve learning outcomes from fourth-grade elementary school students.

Table 14 shows the t-test results in a broader trial showing the sig value (2-tailed) $0.000 < 0.005$, so that H_0 is rejected and H_a is accepted, it can be concluded that there is a difference in the average results before and after treatment, meaning that there is an influence of the use of song-assisted Artsteps media. It can be seen from the table above that the results after treatment are superior to the results before treatment. Based on the results after this treatment, students' scores increased

after using Artsteps learning media assisted by songs. So, the conclusion is that Artsteps learning media using

songs can improve student learning outcomes on animal life cycle material.

Table 13. T-Test Results on Limited Trials Paired Samples Test

	Mean	Std. Deviation	Std. Error Mean	Paired differences		t	df	Sig.(2-tailed)
				95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Before-After	-36.667	23.381	9.545	-61.203	-12.130	-3.841	5	0.012

Table 14. T-Test Results on Wide Trials Paired Samples Test

	Mean	Std. Deviation	Std. Error Mean	Paired differences		t	df	Sig.(2-tailed)
				95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Before-After	-20.467	14.029	-2.561	-25.705	-15.229	-7.999	29	0.000

N-Gain Test

The average increase test was conducted to determine the average increase before and after treatment. Calculating the rise in the average value before and after treatment uses the N-Gain analysis technique. N-Gain is a normalized gain obtained by comparing scores before and after treatment with the difference between SMI and before treatment. Gain increases the average learning outcomes in presentation and data collection material after using the Artsteps learning media using songs Presentation and Data Collection.

Based on the results of calculating the average increase (N-Gain) in extensive trials, it is known that there was an average increase of 0.56, which is included in the medium criteria.

Details regarding the research results are presented in the description below:

Collect Potential and Problem Information

Information on the problems was obtained through observations and interviews conducted in class IV of Sampangan 02 National Primary School Semarang City. It is known that students feel bored and less interested in studying a learning topic. Apart from that, the learning media teachers use during learning does not help students understand the learning material.

Based on the results of the calculation of the average increase (N-Gain) in the limited trial, it is known that there was an average increase of 0.59, which is included in the medium criteria.

Table 15. N-Gain Test Results on Limited Trials Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
N-Gain	6	0.25	0.88	0.5954	0.25
Valid N (listwise)	6				

Table 16. N-Gain Test Result on Wide Trials Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
N-Gain	30	-09	1.00	0.5686	0.32305
Valid N (listwise)	30				

Data Collection

Data for developing Artsteps learning media using songs was obtained through observation, interviews, and qualitative teacher and student needs questionnaires. Data on the feasibility of Artsteps using songs on animal life cycle material was obtained through a material expert validation questionnaire, and the media was analyzed qualitatively. Data on student responses to Artsteps learning media using songs on animal life cycle material was obtained through a qualitative questionnaire. Data on improving student learning outcomes Artsteps learning media using the song on simple animal life cycle material was obtained

through evaluations before and after using the media. These were analyzed quantitatively with normality tests, t-tests, and n-gain tests using SPSS.

Initial Product Development

The development design of Art Steps, assisted by songs to improve learning outcomes in the animal life cycle, is formulated through surveys assessing the requirements of both teachers and students. It is constructed in alignment with the learning objectives outlined in the independent curriculum and customized to cater to the needs of the students. The steps for creating the Artsteps design assisted by songs are

divided into several stages, including determining the theme within Artsteps; reviewing learning achievements and objectives for fourth-grade elementary school classes; creating product designs in layout form; arranging the display or presentation in Artsteps; creating coverings starting from the background, background music, and coloring Artsteps attractively according to the needs of elementary school students; creating songs using existing songs, then making an animated video containing lyrics explaining both complete and incomplete metamorphosis.

Learning media is created using the website <https://www.artsteps.com/>. The Artsteps website is a

platform used to create virtual exhibitions. Then, for editing, Canva creates a more attractive Artsteps appearance with suitable color combinations. The Artsteps media is a product output with a 3D virtual exhibition (Wahyu et al., 2023). The resulting art steps can be accessed as if following directional instructions through a museum exhibition. The Artsteps learning media assisted by songs can be accessed through the link:

<https://www.artsteps.com/view/65bd2f0ea083565b3bcef61c>. The Artsteps product can be seen in Figure 1.



Figure 1. Display of Artsteps product: (a) Initial exhibition display; (b) Initial entrance display to the exhibition; and (c) Top view of the exhibition

The researcher utilizes Artsteps as an engaging learning tool to foster students' interest and learning outcomes. Below is an image that illustrates the material on the life cycle of animals within the Artsteps media.



Figure 2. Display of concept map and material on the life cycle of animals



Figure 3. Display of material on the life cycle of animals without metamorphosis



Figure 4. Display of material on complete and incomplete metamorphosis

Not only did the researcher present the material, but there is also a song that can boost students' learning enthusiasm (Prananda et al., 2022). The song is in the form of a video with lyrics embedded in it. The song used in this animated video adapts a children's song titled 'Potong Bebek Angsa,' with its lyrics modified according to the material chosen by the researcher, which is the life cycle of animals. The song in the animated video is divided into 2 verses: the first verse explains complete metamorphosis, while the second verse explains incomplete metamorphosis. The researcher selected 10 animals, divided into 2 categories: 5 undergoing complete metamorphosis and 5 undergoing incomplete metamorphosis. The lyrics of the song are as follows.

The lyrics are about animals undergoing complete metamorphosis, such as frogs.

*Siklus hidup katak terdiri 4 fase
Telur kecebong katak muda katak dewasa
Katak bertelur menjadi kecebong
Jadi katak muda lalu katak dewasa
Katak dewasa akan bertelur
Dan siklus hidupnya dimulai lagi*

Video link:

<https://youtu.be/XnF8B06Peew?si=Ls7BCiyOXVUMGGrm>

The lyrics are about animals undergoing incomplete metamorphosis, such as cockroaches.

*Siklus hidup hewan Terdiri 3 fase
Telur nimfa imago itulah fasenya
Kecoa bertelur menjadi nimfa
Lalu jadi imago kecoa dewasa
Kecoa dewasa akan bertelur
Dan siklus hidupnya dimulai lagi*

Video link:

<https://youtu.be/y7wt92eMDzE?si=ZLmFkWEyTD-n8fgS>

By using existing songs, students can more easily follow along with the melody, allowing them to engage with the song created by the researcher smoothly. Replacing the existing song lyrics with material about the life cycle of animals is hoped to enhance students' learning outcomes in the learning process.

Product Validation

The validity formula calculations yield a percentage value of 91%, so according to the validity criteria table, the final Artsteps validation value falls into the value range of 85.1% - 100% with a very valid validation level.

Table 17. Artsteps Learning Media Using Song Test Results

Validator	Score Percentage (%)	Criteria
Media	92	Very valid
Material	90	Very valid
Average (%)	91	Very valid

Small-Scale Trials

The small-scale trial was tested on research subjects, namely 6 grade IV students at Sampangan 02 National Primary School Semarang City. The limited trial begins with carrying out pre-test activities first, then continues with testing the song-assisted Artsteps that have been developed for the science and science learning content on animal life cycles, after that providing a questionnaire on student responses to the implementation of the learning activities and ending with giving an evaluation.

Learning begins by showing Artsteps learning media using a projector so that students learn together in class; then, students are asked to take turns singing songs provided on Artsteps media. Then, students are asked to create a group scheme according to the animal life cycle material. After that, students do an evaluation. The learning atmosphere looks fun, and students are active when learning activities occur. This is proven by the results of the student response questionnaire, which was 95% and entered the perfect criteria.

Large-Scale Practice Test

A large-scale trial was conducted with 37 fourth-grade students from SD Negeri Sampangan 02 Semarang as research participants. The students' responses to Artsteps with song assistance on the topic of animal life cycles were evident from the student response questionnaire results. These responses were gathered from limited and extensive trial activities, and their average was calculated from the student response questionnaire outcomes. In the extensive trial, questionnaires were administered to students to gauge their responses to Artsteps learning media with song assistance on animal life cycles. The average student response obtained from the previous limited trial was 96%. After administering the student response questionnaire in the extensive trial, the student response decreased to 94%. Consequently, the final average student response was 95% and entered the very criteria well.

Conclusion

This research developed a digital-based learning media called Art Steps, which was assisted by songs on the topic of the life cycle of animals. Based on the expert analysis, the scores from the content expert team were 90% and from the media expert team were 92%, which falls into the highly valid category, indicating that the Artsteps media assisted by songs is suitable for use. The survey responses from teachers and students showed an average final score of 94.7%, categorized as excellent. This demonstrates that the users (teachers and students) responded very positively when implementing the learning process using Art steps, which were assisted by songs on the topic of the life cycle of animals. There was a difference in the average learning outcomes before and after using the Artsteps media assisted by songs in both limited and extensive tests, as indicated by the t-test. The significance value (2-tailed) in the limited test was $0.012 < 0.05$; in the comprehensive test, it was $0.000 < 0.05$. This indicates a favorable impact of incorporating songs into the development of Art steps learning media on learning outcomes. Hence, a notable disparity exists between learning outcomes before and after utilizing art steps

and learning media complemented by songs. Given the research findings and the success of integrating songs into Art steps, subsequent endeavors in developing learning media will focus solely on animals undergoing metamorphosis. It is suggested that future researchers expand the content of the Artsteps media assisted by songs so that it is not limited and can have a broader scope, thus increasing knowledge and improving student learning outcomes in science subjects.

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Author Contributions

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Conflicts of Interest

The authors declare no conflict of interest.

References

- Agustina, I., Aprina Siregar, L., & Liliani Husain, D. (2023). Utilization of Digital Technology in Children's Education to Enhance Creative and Interactive Learning. *Journal of Education, Social, and Culture*, 10. <https://doi.org/10.32505/tarbawi.v10i2.6970>
- Aka, K. A., Lee, & Owen. (2019). Integration Borg & Gall. *Journal of Physics: Conference Series*, 13(1). <https://doi.org/10.1088/1742-6596/1318/1/012022>
- Alfatolah, I. N. A., Kisda, Y. V., Septarina, A., Ravika, A., & Jadidah, I. T. (2023). Kesulitan Belajar Peserta Didik pada Mata Pelajaran IPAS Kurikulum Merdeka Kelas IV. *Jurnal Basicedu*, 7(6), 3397–3405. <https://doi.org/10.31004/basicedu.v7i6.6372>
- Arief, A., & Isnain, F. (2020). Children Songs as A Learning Media Used in Increasing Motivation and Learning Student in Elementary School. *International Journal of Visual and Performing Arts*, 2(1), 1–7. <https://doi.org/10.31763/viperarts.v2i1.54>
- Arikunto, S. (2013). *Prosedur Penelitian Suatu Pendekatan Pratik*. Jakarta: PT. Rineka Cipta.
- Arisandi, I. M. A., & Putra, D. B. K. N. S. (2022). Media Permainan Kartu Bergambar Mengenai Siklus Hidup Hewan Siswa Kelas IV SD. *Journal for Lesson and Learning Studies*, 5(1), 85–95. <https://doi.org/10.23887/jlls.v5i1.47757>
- Astuti, R., maslikhatun Nisak, N., Nadlif, A., & Zamzania, A. W. H. (2021). Animated video as a media for learning science in Elementary School. *Journal of Physics: Conference Series*, 1779(1), 12051. <https://doi.org/10.1088/1742-6596/1779/1/012051>
- Azis, A. G., & Rusmana, I. M. (2020). Pengembangan Media Lagu Rumus Matematika Berbasis Audio Player Untuk Kelas Vi Sd/Sederajat. *Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*, 1(3). <https://doi.org/10.46306/lb.v1i3>
- Cruz, S., & Torres, A. (2022). *Virtual And Immersive Learning Environments Using Artsteps: Exploratory Study With Teachers*. Retrieved from <http://www.artsteps.com/>
- Delima, D., & Hidayat, H. (2022). Pengembangan Media Pembelajaran Berbasis Powtoon Pada Mata Pelajaran IPA Materi Daur Hidup Hewan. *Pedagogi: Jurnal Ilmiah Pendidikan*, 8(2), 96–101. <https://doi.org/10.47662/pedagogi.v8i2.374>
- Dewi, A. C. (2021). Development of Educational Game Media Based on Android Animal Life Cycle Materials in 4 th Grade Elementary School. In *7th International Conference on Education and Technology (ICET)* (2021). <https://doi.org/10.2991/assehr.k.211126.028>
- Dumitrescu, G., Lepadatu, C., & Ciurea, C. (2014). Creating Virtual Exhibitions for Educational and Cultural Development. *Informatica Economica*, 18(1/2014), 102–110. <https://doi.org/10.12948/issn14531305/18.1.2014.09>
- Handayani, S. L., & Dahlia, I. (2022). ANIMA-LIE: Android-Based Learning Media on Animal Life Cycles Materials for Elementary School. *Jurnal Ilmiah Sekolah Dasar*, 6(2), 287–294. <https://doi.org/10.23887/jisd.v6i2.45359>
- Henrietta, I., & Amaka, K. G. K. L. B. (2017). Selecting Media For Effective Learning In Online And Blended Courses: A Review Study. *Journal of Educational Multimedia and Hypermedia*, 26(1), 29–59. Retrieved from <https://www.learntechlib.org/p/173341/>
- Herliyani, E., Wardana, K. N. H., & Witari, N. N. S. (2022). Pembelajaran Artsteps, Minat Penerapan Teknologi Pameran Online, dan Kepuasan Mahasiswa dalam Berkarya. *Edukasi: Jurnal Pendidikan*, 20(1), 58–72. <https://doi.org/10.31571/edukasi.v20i1.3420>
- Iasha, V., Rachmadtullah, R., Sudrajat, A., & Hartanti, D. (2019). The Impact Interactive Learning Media on The Learning Outcomes of Fifth Grade Social Science Knowledge in Elementary Schools. In

- ICTES 2018: *Proceedings of the First International Conference on Technology and Educational Science, ICSTES 2018*. <https://doi.org/10.4108/eai.21-11-2018.2282120>
- Izhar, G., Senen, A., Wardani, K., & Ningrum, D. S. C. (2023). Android-Based Interactive Learning Multimedia: Social Studies Material for Fourth Grade Elementary School Students. *Jurnal Ilmiah Sekolah Dasar*, 7(2), 224–235. <https://doi.org/10.23887/jisd.v7i2.56305>
- Kadek, I., Yuswantara, J., Made, I., & Wibawa, C. (2021). Animal Life Cycle Media Using Digital Comics for Fourth-Grade Elementary School Students. *International Journal of Elementary Education*, 5(3), 366–374. Retrieved from <https://ejournal.undiksha.ac.id/index.php/IJEE>
- Kamila, N. H., Prasetyo, T., & Muhiyati, I. (2023). Pengembangan Media Pembelajaran Berbasis Website Menggunakan Google Sites Materi Siklus Hidup Hewan Kelas IV di SD Negeri No.178491 Pintu Pohan. *Jurnal Pengajaran Sekolah Dasar*, 2(2), 133–144. <https://doi.org/10.56855/jpsd.v2i2.782>
- Karo-Karo, I. R., & Rohani, R. (2018). Manfaat Media Dalam Pembelajaran. *AXIOM : Jurnal Pendidikan Dan Matematika*, 7(1), 91–96. <https://doi.org/10.30821/axiom.v7i1.1778>
- Kusnulyaningsih, D., Husniati, H., & Jiwandono, I. S. (2022). Pengembangan Media Pembelajaran Berbasis Video Animasi pada Muatan Seni Budaya dan Prakarya Kelas IV SDN 39 Mataram. *Jurnal Ilmiah Profesi Pendidikan*, 7(2), 480–486. <https://doi.org/10.29303/jipp.v7i2.677>
- Lestari, K. E., & Yudhanegara, M. R. (2017). *Penelitian Pendidikan Matematika*. Bandung: PT. Refika Aditama.
- Lovandri, D., & Putra, I. (2015). Pengembangan Multimedia Pembelajaran Interaktif Mengenal Angka Dan Huruf Untuk Anak Usia Dini. *Jurnal Inovasi Teknologi Pendidikan*, 2(2), 169–178. <https://doi.org/10.21831/tp.v2i2.7607>
- Miaz, Y., Helsa, Y., Zuardi, Y., Febrianto, R., & Erwin, R. (2019). The development of interactive multimedia-based instructional media for elementary school in learning social sciences. *Journal of Physics: Conference Series*, 1321(3). <https://doi.org/10.1088/1742-6596/1321/3/032107>
- Nurajizah, S. (2016). Implementasi Multimedia Development Life Cycle Pada Aplikasi Pengenalan Lagu Anak-Anak Berbasis Multimedia. *PROSISKO: Jurnal Pengembangan Riset Dan Observasi Sistem Komputer*, 3(2). Retrieved from <https://doi.org/https://ejournal.lppmunsera.org/index.php/PROSISKO/article/view/18>
- Palieraki, S., & Koutrouba, K. (2021). Differentiated instruction in information and communications technology teaching and effective learning in primary education. *European Journal of Educational Research*, 10(3), 1487–1504. <https://doi.org/10.12973/EU-JER.10.3.1487>
- Prananda, G., Judijanto, L., Purwoko, B., Lestari, N. C., & Efendi, N. (2023). Application of Demonstrated Learning Methods to Increase Primary School Students' Science Learning Results. *Jurnal Penelitian Pendidikan IPA*, 9(12), 12175–12181. <https://doi.org/10.29303/jppipa.v9i12.6344>
- Priyatno. (2018). *SPSS: Panduan Mudah Olah Data bagi Mahasiswa dan Umum*. CV. Andi Offset.
- Puspitarini, Y. D., & Hanif, M. (2019). Using Learning Media to Increase Learning Motivation in Elementary School. *Anatolian Journal of Education*, 4(2), 53–60. <https://doi.org/10.29333/aje.2019.426a>
- Safitri, M. N. (2022). The Impact of Song and Picture Media on the Memory Ability of Elementary School Students in Science Subjects. *International Journal of Elementary Education*, 6(3), 477–485. <https://doi.org/10.23887/ijee.v6i3.53042>
- Sari, N. R. (2018). Animation Media to Improve Student Learning Results. *Jurnal Tadris Matematika*, 1(2). <https://doi.org/10.21274/jtm.2018.1.2.145-156>
- Setiawan, H., Riandi, R., & Supriatno, B. (2022). Inovasi Metode Gallery Walk pada Pembelajaran Online dengan Aplikasi Artsteps selama Pandemi Covid-19. *Asatiza: Jurnal Pendidikan*, 3(2), 78–94. <https://doi.org/10.46963/asatiza.v3i2.526>
- Simbolon, R. H. J., Lumbanraja, B., Silaban, P. J., Abi, A. R., & Anzelina, D. (2023). The Effect Of Using Song On The Fourth-Grade Students' Learning Motivation In Natural Science Learning Subject At Free Methodist 2 Private Elementary School Medan. *Jurnal Pajar (Pendidikan Dan Pengajaran)*, 7(4), 896. <https://doi.org/10.33578/pjr.v7i4.9479>
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Alfabeta.
- Suryadi, A., Darmawan, D., Rahadian, D., Wahyudin, D., Riyana, C., Cabe Raya, J., Cabe, P., Tangerang Selatan, K., Terusan Pahlawan No, J., Tarogong Kidul, K., & others. (2022). Pengembangan aplikasi sistem database Virtual Community Digital Learning Nusantara (VCDLN) menggunakan model waterfall dan pemrograman terstruktur. *Jurnal Petik*, 8(1), 48–56. Retrieved from <https://shorturl.asia/xB678>
- Taqiyyah, F. (2023). Learning Crafts to Support the Creativity of Elementary School. *ArTiES: International Journal of Arts and Technology in Elementary School*, 1(2), 55–060. <https://doi.org/10.24176/arties.v1i2.11715>

- Wahyu, R., Mukti, T., & Fathurrahman, M. (2023). Development of Artsteps Learning Media to Improve Music Arts Learning Outcomes. *Jurnal Pendidikan Teknologi Informasi (JUKANTI)*, 6(2), 329-341.
<https://doi.org/10.37792/jukanti.v6i2.1049>
- Wati, T. R., Poernomo, J. B., & Pratama, F. R. (2022). Pengembangan Electronic Student Worksheet Bercirikan Higher Order Thinking Skill dan Model Learning Cycle 7E pada Materi Elastisitas. *Jurnal Eksakta Pendidikan (JEP)*, 6(1), 28-35.
<https://doi.org/10.24036/jep/vol6-iss1/638>
- Widianto, E. (2021). Pemanfaatan media pembelajaran berbasis teknologi informasi. *Journal of Education and Teaching*, 2(2), 213-224.
<https://doi.org/10.24014/jete.v2i2.11707>
- Widyaningrum, F. A., Maryani, I., & Vehachart, R. (2022). Literature Study on Science Learning Media in Elementary School. *International Journal of Learning Reformation in Elementary Education*, 1(01), 1-11. <https://doi.org/10.56741/ijlree.v1i01.51>
- Yustikadewi. (2023). Pengembangan Media Video Story Telling Pada Siklus Hidup Kelas Iv Sd. *JIPD) Jurnal Inovasi Pendidikan Dasar*, 7(1), 9-14.
<https://doi.org/10.36928/jipd.v7i1.1744>