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Teaching the Classification of Living Things Through Music: Development of Song-Based Video Clip Learning Media

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ABSTRACT
This study aims to develop song-based video clip learning media to support science learning on the topic of classification of living things for seventh-grade students within the framework of the Merdeka Curriculum. This research employed a Research and Development (R&D) method using the 4D model (define, design, develop, and dissemi nate). The sample consisted of 30 Grade VII students selected using purposive sampling as part of a limited trial. Data were collected through interviews, questionnaires, and learning outcome tests, and analyzed using descriptive statistics and N-Gain analysis. The results indicate that the developed media is valid, practical, and effective. The material validity reached 91%, while practicality responses showed that the media was easy to use and engaging. The effectiveness test produced a high N-Gain score of 0.77, indicating significant improvement in students' learning outcomes. These findings imply that song-based video clip learning media can be used as an innovative instructional tool to enhance students' engagement and understanding, particularly for abstract science topics.

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INTRODUCTION

Within the framework of science learning in the Merdeka Curriculum, teachers are required to design meaningful and student-centered learning experiences (Amalia & Achadi, 2023; Syahbana et al., 2024). However, in practice, the use of instructional media in science classrooms, particularly for abstract topics such as classification of living things, remains limited and less engaging.

The use of technology in learning media contributes significantly to enhancing the quality of the instructional process. Learning media assist teachers in presenting learning materials in ways that are easier for students to understand (Melinda & Saputra, 2021; Pratama et al., 2023). In addition, learning media encourage students to participate actively, broaden their knowledge, provide opportunities for exploration, and enable interaction between teachers and students, including in distance learning contexts (Susanto & Prawitasari, 2023). The incorporation of instructional media into classroom instruction has been shown to enhance students' interest in learning activities (Wijayanti & Relmasira, 2019). Increased learning interest can foster students' optimism in achieving

learning goals and allow them to learn anytime and anywhere (Onah et al., 2020; Rahmi & Samsudi, 2020). Prior research demonstrates that appropriate instructional materials play an important role in enhancing students' biology achievement, thereby emphasizing the necessity of innovative instructional media (Saleh & Arya, 2025).

As a tool that supports teachers in delivering instructional content (Arimadona et al., 2022), learning media should also possess attractive and engaging characteristics in order to motivate students to learn (Paat et al., 2022; Puspitarini & Hanif, 2019). Besides serving as a tool for presenting learning materials, learning media also contribute to increasing students' motivation and engagement in classroom learning (Afrilia et al., 2022; Audie, 2019; Tampubolon & Tampubolon, 2025). Higher levels of learning motivation can subsequently lead to better academic performance (Amir et al., 2021; Everaert et al., 2017; Marta et al., 2020).

In educational practices, learning media may appear in several formats, such as audiovisual media. Audiovisual media function as instructional tools that deliver messages through both visual and auditory elements, thereby engaging students' senses of sight and hearing (Salsabila et al., 2020). Various forms of audiovisual media have been developed in educational contexts, including Powtoon videos (Anjarsari et al., 2020), animated videos (Arimadona et al., 2022), and song-based video clips (Kusuma & Airlanda, 2022). Song-based video clips represent a form of learning media that delivers instructional content through lyrics arranged in a musical format (Winel et al., 2023). By combining audio and visual elements, this media helps students understand the material through multiple sensory experiences (Halimatul Iim Mu'minah, 2021).

In relation to the use of learning media, preliminary observations were conducted at SMP Negeri 11 Tanjungpinang. These findings were obtained through preliminary observations, including classroom observations and interviews with science teachers. The findings showed that the learning media used in science classes were still limited in number and lacked variation. This condition is consistent with previous findings showing that teaching materials are still dominated by conventional formats and have not optimally encouraged students' active participation (Suryaningrum et al., 2024). This situation reduced students' interest and motivation to participate in learning activities. Consequently, students became less engaged during the learning process, which ultimately affected their learning outcomes. Previous findings also revealed that although teaching materials are considered adequate, students' classroom activity remains relatively low, indicating the need for more interactive and engaging learning media (Suryaningrum et al., 2024).

One of the topics that students found challenging was the classification of living things. Observations at SMP Negeri 11 Tanjungpinang revealed that many students experienced difficulties in understanding this topic. This finding was supported by students' test results, which showed that a considerable number of students scored below the minimum mastery criterion (KKM).

The challenges identified in the learning process underline the need to develop innovative learning media that can effectively address these problems. In reality, science teachers at SMP Negeri 11 Tanjungpinang still rely mainly on traditional instructional materials, such as textbooks, student worksheets (LKPD), and learning modules. Based on the needs analysis, students demonstrated a stronger preference for learning activities that use audiovisual media. The use of audiovisual resources in the classroom can encourage greater student participation and create a more engaging learning environment. Research findings indicate that audiovisual media can promote greater student involvement in learning activities while also increasing their interest in the learning material (Raisa et al., 2018). To improve the effectiveness of learning, teachers should employ instructional media that are suitable for students' characteristics and learning needs (Diah Masturah et al., 2018). Although previous studies have explored the use of audiovisual media and music-based learning in education, limited research specifically integrates song-based video clips with science content, particularly on the topic of classification of living things at the junior high school level. Moreover, existing studies tend to focus on general engagement without systematically evaluating the validity, practicality, and effectiveness of such media through

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a structured development model. Therefore, this study attempts to fill this gap by developing and systematically evaluating song-based video clip learning media using the 4D model.

In response to the issues outlined above, this study focuses on developing a song-based video clip learning medium for teaching the classification of living things that fulfills the criteria of validity, practicality, and effectiveness. Therefore, developing innovative and engaging instructional media is essential to address the limitations of conventional teaching materials and to enhance students' learning outcomes.

METHOD

This research was conducted to develop a song-based video clip learning medium for teaching the topic of classification of living things that meets the criteria of validity, practicality, and effectiveness. The study applied a Research and Development (R&D) method using the 4D development model introduced by Thiagarajan (1974), which includes four main stages: define, design, develop, and disseminate. The 4D model was adopted for this study due to its systematic and structured framework in instructional media development, particularly in ensuring the validity, practicality, and effectiveness of the product compared to other development models. The procedural stages of the research are presented in Figure 1.

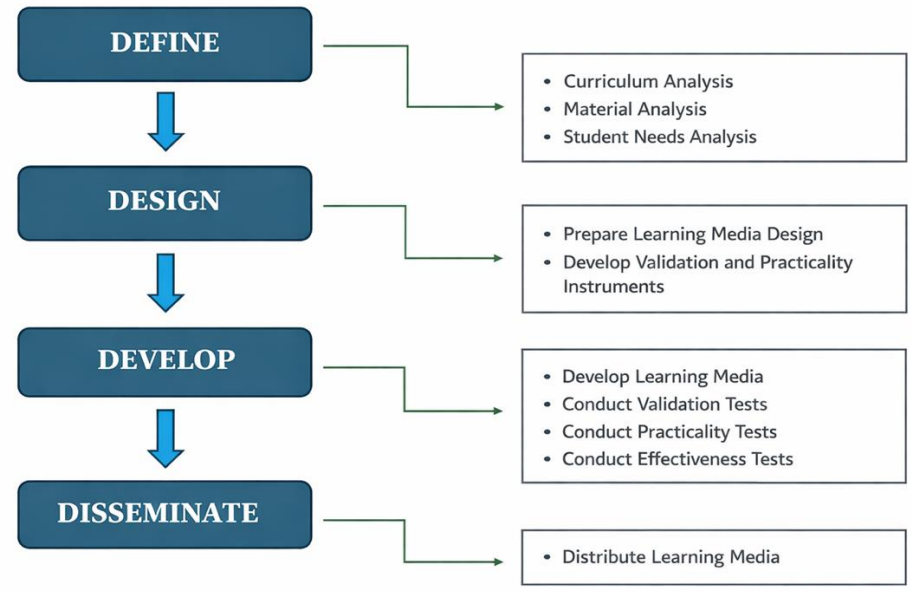

Figure 1. Research stages based on the 4D model

At the define stage, preliminary analyses were carried out to identify learning needs, including curriculum analysis, material analysis, analysis of student characteristics, and media needs analysis. The required data were obtained through interviews with science teachers, questionnaires distributed to students, and document analysis.

In the design stage, the structure and concept of the song-based video clip learning media were formulated based on the findings from the define stage. Additionally, research instruments were developed to assess the validity, practicality, and effectiveness of the media.

In the develop stage, the learning media was produced and subsequently evaluated through expert validation involving material experts, media experts, and a music expert. The material validation employed indicators related to content suitability, alignment with learning objectives, and language clarity, as presented in Table 1.

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Table 1. Blueprint of the Material Validation Questionnaire

No	Aspect	Indicators
1	Material	Alignment with the subject matter
		Alignment with learning outcomes (CP)
		Alignment with learning objectives (TP)
2	Content	Appropriateness of the material
		Suitability of the song lyrics content
		Suitability of the visual representation
		Relevance to technological developments
		Attractiveness of the media in increasing students' learning interest
3	Language	Appropriateness of language use
		Use of simple and easily understandable language
		Accuracy in pronouncing Latin names

Source: Adapted from Cahyani in Ritonga (2020)

Furthermore, media validation focused on layout, presentation, typography, color, and programming aspects, as presented in Table 2.

Table 2. Blueprint of the Media Validation Questionnaire

No	Assessment Aspect	Indicator
1	Layout	Suitability of images with the song lyrics content
		Suitability of video with the song lyrics content
2	Presentation	Clarity of image quality presentation
		Clarity of video quality presentation
		Attractiveness of the video clip design
		Appropriateness of font selection
3	Music	Clarity of audio
4	Typography	Appropriateness of font type selection
		Appropriateness of font size selection
5	Color	Appropriateness of color selection in the video clip design
6	Language	Accuracy of language use
7	Media Programming	Appropriateness of video clip duration

Source: Adapted from Maryanti & Kurniawan (2018)

The musical component was also evaluated based on pitch accuracy, rhythm, tempo, and dynamics (Campbell et al., 2006), as described in Table 3.

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Table 3. Blueprint of the Music Validation Questionnaire

No	Skill / Aspect
1	Accuracy of pitch in the song-based video clip
2	Accuracy of rhythm pattern in the song-based video clip
3	Appropriateness of lyrics with the tempo of the song
4	Accuracy of tempo in the song-based video clip
5	Accuracy of dynamics in the song-based video clip

After being declared valid, the product underwent a practicality test involving one science teacher and 30 students using a questionnaire instrument, with indicators summarized in Table 4. The sample was selected using purposive sampling, considering the accessibility and relevance of the students to the research objectives, and was categorized as a limited trial in the development stage

Table 4. Blueprint of the Practicality Test Questionnaire for Teachers and Students

No	Aspect	Indicator
1.	Ease of Use	Easy to store on electronic devices (computers, laptops, and smartphones)
		Easy to use at any time
		Easy to use anywhere
		Does not require printing
		Use of language that is easy to understand
		Audio can be heard clearly
		Visual elements can be seen clearly

Source: Adapted from Asiyani (2019)

Following the practicality evaluation, an effectiveness test was conducted with the participation of the same 30 students. The effectiveness of the developed instructional media was determined through a learning achievement test administered to the students. Data obtained from the validity and practicality evaluations were analyzed using a Likert scale approach (Albaum, 1997). The percentages of validity and practicality scores were then calculated using the following formula.

$$K = \frac{F}{N.I.R} \times 100\%$$

Where:
K = the percentage of validity or practicality score
F = the total score obtained
N = the maximum possible score.
I = the number of questionnaire items
R = the number of respondents involved in the assessment.

The data from validity and practicality assessments were analyzed using a Likert scale approach, and the interpretation criteria of Riduwan (2018) are presented in Table 5.

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Table 5. Percentage Criteria for Validity and Practicality Assessment

Percentage	Score	Validity Category	Practicality Category
75% – 100%	4	Very Valid	Very Practical
50% – 74%	3	Valid	Practical
25% – 49%	2	Invalid	Not Practical
0% – 24%	1	Very Invalid	Very Impractical

To examine the improvement in students' learning achievement, the effectiveness of the developed media was measured using the N-Gain <g> calculation proposed by Hake (1998). The interpretation of the obtained N-Gain values is provided in Table 6.

Table 6. Interpretation of N-Gain values <g>

N-Gain Values <g>	Interpretation
$0.00 \leq (G) \leq 0.30$	Low
$0.30 \leq (G) \leq 0.70$	Medium
$0.70 \leq (G) \leq 1.00$	High

The 4D development model concludes with the dissemination stage. During this stage, the developed song-based video clip learning media was distributed to science teachers at SMP Negeri 11 Tanjungpinang as the research site. The dissemination process was carried out to introduce the developed media and promote its use in science lessons, particularly when teaching the classification of living things. This stage also ensured that the media could be applied in authentic classroom environments to support instructional activities at the school.

RESULTS AND DISCUSSION

The results of this study are presented according to the stages of the 4D development model, namely define, design, develop, and disseminate.

1. Define Stage

During the define stage, the researcher conducted several initial analyses. The results showed that SMP Negeri 11 Tanjungpinang uses the Merdeka Curriculum as the basis for instruction. By referring to the curriculum document, the researcher reviewed the topic of classification of living things through the analysis of learning outcomes (CP), which were then used to formulate the learning objectives (TP). This process ensured that the developed learning media corresponded with the curriculum framework.

The Merdeka Curriculum aims to transform education and learning in order to produce Indonesian human resources who are competitive and competent in their respective fields (Amalia & Achadi, 2023). This curriculum is designed to encourage the development of students' critical thinking and creativity in order to prepare them for challenges they may encounter in the future (Syahbana et al., 2024).

The analysis of students' needs showed that appropriate instructional media are required to encourage students' interest and motivation during the learning process. Currently, the learning media used in science classes tend to be monotonous and limited in variety. Based on students' characteristics, students tend to prefer learning activities that utilize audiovisual-based instructional media. Based on questionnaire results, 83% of students indicated a preference for audiovisual learning media, while 76% reported difficulties in understanding classification concepts using conventional materials.

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a. Material Analysis

The first analysis conducted was the material analysis. Based on literature studies and curriculum analysis, the researcher selected the topic of classification of living things to be developed into a song-based video clip learning media. The selection of this topic was based on the learning outcomes (CP) and learning objectives (TP) specified in the Merdeka Curriculum document.

According to Nurkhasanah (2018), the topic of classification of living things is often considered difficult for students. Students frequently experience difficulties in understanding the grouping of organisms, scientific names, and examples of organisms that they have never encountered before.

b. Students' Needs Analysis

The next step involved identifying students' needs. In this phase, the researcher investigated the availability of instructional media for the topic of classification of living things and conducted interviews with science teachers to obtain information about the learning media currently applied in the school.

The interview findings showed that students require more creative and engaging media that can enhance their learning motivation and improve their academic performance. Nurrita (2018) states that the use of learning media can make the learning process more engaging and effective, which helps students grasp the material more easily.

c. Student Characteristics Analysis

The final analysis focused on identifying students' characteristics during the learning process. The results of this analysis served as the basis for designing the learning media to be developed.

According to Lantowa et al. (2022), learner analysis involves examining students' characteristics that are relevant to the design of learning materials. These characteristics include students' learning styles during classroom activities. Several studies emphasize that understanding students' learning styles is important in the learning process because it helps teachers design appropriate instructional strategies (Chantika et al., 2024; Telaumbanua & Harefa, 2024) Learning styles refer to the preferred ways students process and understand information during learning activities.

2. Design Stage

The design phase constitutes the second stage of the 4D development model. In this stage, the researcher developed the concept of the song-based video clip learning media using Adobe Premiere Pro and Cubase Pro 12.

The developed media contains song lyrics that represent the concepts of classification of living things. In addition, the researcher designed the musical structure of the song. The song was composed using the same musical notation but with different lyrics corresponding to various subtopics within the classification of living things. This approach allows students to learn biological concepts through music and audiovisual representation simultaneously. The integration of music in learning has been shown to support cognitive processing, memory retention, and attention, which are essential components of meaningful learning (Ding et al., 2024; Lu et al., 2025). In addition, music-based learning activities can enhance learners' engagement and support the development of twenty-first-century learning skills (Su Sinn & Ku Wing, 2024).

Previous studies have suggested that audiovisual learning media can enhance students' engagement and comprehension by combining visual and auditory information (Fiorella & Mayer, 2018; Mayer, 2021). Learning environments can become more engaging and meaningful when instructional media integrates both music and video elements.

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3. Develop Stage

The research then entered the develop stage after the design phase was completed. As the third stage of the 4D development model, this phase involved producing the song-based video clip learning media based on the design that had been formulated previously. Several screenshots illustrating the developed learning media can be seen in Figure 1.

Figure 1. Screenshots of the song-based video clip learning media on the classification of living things

a. Material, Media, and Music Validity

After completing the development stage, the developed media was evaluated through a validation process involving the assessment of material, media, and music aspects. The summary of the validation results is provided in Table 7

Table 7. Validation Results of the Song-Based Video Clip Learning Media

No	Aspect	Percentage	Category
1	Material	91%	Very Valid
2	Media	79%	Very Valid

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No	Aspect	Percentage	Category
3	Music	90%	Very Valid

The validation of the material aspect produced a score of 91%, indicating that the developed learning media meets the very valid criteria. The language aspect was also rated very valid because the language used in the media was arranged in a clear and understandable manner for students. In the learning process, language has an important role as a medium for communicating information to learners (Wicaksono, 2016).

Similarly, the media validity test produced a result of 79%, which is categorized as very valid. The slightly lower score in the media aspect compared to the material and music aspects may be influenced by design elements such as layout, typography, or visual synchronization, which require further refinement to optimize user experience. In terms of presentation, the song-based video clip effectively delivers learning content through the integration of visual and audio elements. Huda & Ardi (2021) states that audiovisual media are more effective in conveying messages compared to text-only media because they stimulate multiple sensory channels simultaneously. This finding is consistent with previous studies which indicate that well-designed audiovisual media tend to achieve high validity due to their ability to integrate multiple learning elements effectively (Mayer, 2021).

The visual aspects, including typography, color selection, language use, and media programming, also contributed to the high validity score. According to Fridayanti et al. (2022), effective multimedia learning materials should integrate visual elements such as images, text, and animations in a well-designed format to enhance students' attention and understanding during learning activities.

The music validity also showed a very valid result with a percentage of 90%. This indicates that the musical components used in the learning media are appropriate for supporting the learning process. Music-based learning has been shown to improve students' memory retention, create a positive emotional atmosphere, and reduce anxiety during learning (Kusuma & Airlanda, 2022).

b. Practicality Test

Following the validation of the product, the research proceeded to the practicality testing stage, which involved one science teacher and students from SMP Negeri 11 Tanjungpinang. A summary of the practicality test results can be found in Table 8.

Table 8. Practicality Test Results

No	Test Subject	Percentage	Category
1	Teacher	88%	Very Practical
2	Students	96%	Very Practical

The results indicate that the developed media is very practical for use in classroom learning. The media can be operated easily without requiring special technical abilities and is able to attract students' attention during learning activities. In this context, practicality refers to the level of ease with which a learning medium can be used by both teachers and students so that the learning process becomes more engaging, meaningful, and enjoyable (Milala et al., 2022). Moreover, effective learning media should allow students to access and utilize it independently on various technological devices (Fridayanti et al., 2022; Mayer, 2021).

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c. Effectiveness Test

After the learning media had been confirmed to be valid and practical, the study continued with an effectiveness test involving 30 seventh-grade students. The effectiveness test was carried out by comparing the results of the pre-test and post-test using 20 objective questions. The outcomes of this effectiveness test are presented in Table 9.

Table 9. Effectiveness Test Results

Category	Pre-test Score	Post-test Score
Highest Score	70	100
Lowest Score	20	75
Average Score	45	87.7
N-gain Average		0.77

The N-gain analysis produced a value of 0.77, indicating that the developed learning media is highly effective. The high N-Gain score indicates that the integration of music and visual elements plays a significant role in enhancing students' understanding. The repetition of concepts through song lyrics, combined with visual representation, supports memory retention and reduces cognitive load, making abstract concepts easier to comprehend. The most influential component of the media lies in the integration of repetitive song lyrics and visual classification schemes, which help students organize biological concepts systematically. This improvement in students' academic achievement shows that the song-based video clip media can facilitate students in comprehending the topic of classification of living things. These findings are aligned with prior studies demonstrating that appropriate teaching materials significantly improve students' biology learning outcomes (Saleh & Arya, 2025).

A learning process can be considered effective when students demonstrate a meaningful increase in their learning achievement after instruction (Kahfi et al., 2019). Furthermore, song-based video clip media present learning content in a more concrete and interesting manner, making it easier for teachers to deliver explanations and for students to understand the concepts being taught (Arofaturrohman et al., 2023).

4. Disseminate Stage

In the dissemination stage, the developed learning media was introduced and implemented in science learning at SMP Negeri 11 Tanjungpinang. The objective of this stage was to ensure that the media could be practically used by teachers in real classroom settings. Teachers responded favorably to the media, emphasizing its potential to improve student engagement and facilitate comprehension of complex concepts. Furthermore, this stage serves as a preliminary step for wider application in comparable educational contexts. The media was implemented in a classroom session and integrated into science instruction, allowing teachers to directly evaluate its usability and effectiveness in real learning conditions.

However, this study has several limitations. The sample size was relatively small and limited to one school, which may affect the generalizability of the findings. In addition, the effectiveness may be influenced by the novelty effect of the media. Future studies are recommended to involve larger samples and longer implementation periods.

CONCLUSION

This study concludes that the developed song-based video clip learning media meets the criteria of validity, practicality, and effectiveness. The validation results showed high scores in material (91%), media (79%), and music (90%) aspects. The practicality test indicated very positive responses from both teachers (88%) and students (96%). Furthermore, the effectiveness test demonstrated a high N-Gain score of 0.77, indicating significant improvement in students' learning outcomes.

These findings suggest that integrating music and audiovisual elements into science learning can enhance student engagement and conceptual understanding. Therefore, this media has strong potential to be implemented more broadly in science education, particularly for abstract topics.

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