



## The Development of Interactive Audio-Visual-Based Media Using VideoScribe to Reduce Misconceptions Electrical Potential and ECG Material

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**Key Words:**

audio visual  
ECG  
electrical potential  
misconception  
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**Abstract:**

This research aimed to assess the suitability of the developed Audio-Visual Media and its effectiveness in reducing student misconceptions. The research follows the R&D (Research and Development) approach, specifically utilizing the ADDIE development model developed by Branch. The research participants comprised 17 9th-grade students from SMP Swasta Hang Tuah 2 Medan. The research procedures included a pre-survey, instrument creation, survey and observation, and validation. The results of the developed media showed that the first indicator, related to the response to material presentation, fell within the "good" category, with a percentage of 80.20%. The second indicator, which assessed the attractiveness of Sparkol VideoScribe's video display, was categorized as "very good," with the highest percentage recorded at 84.25%. Similarly, the response to convenience, representing the third indicator, was considered "good" with a percentage of 80.81%. The fourth indicator was also classified as "good," with a percentage of 79.40%. Based on the data analysis, the developed media is deemed feasible and can be utilized effectively in science learning.

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## Introduction

Science education can be obtained through the learning process, namely, the interaction between teachers and students. In this learning process, students are expected to understand the concepts being taught, not just memorize them ([Manurung et al., 2021](#)). Science, also known as natural science, encompasses a corpus of knowledge comprising observations and research that elucidate the what, why, and how of various phenomena ([Panggabean et al., 2023](#)). Science as a product examines natural phenomena scientifically and systematically. Science is a process of studying how students can act as scientists ([Indayani et al., 2021](#)).

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In their daily lives, students engage with the world of science, and as a result, they bring specific ideas and conceptions about science into the classroom. Therefore, students must clearly understand specific concepts to avoid misconceptions ([Iqbal et al., 2020](#)). Misconceptions are errors in understanding the concepts of learning materials that can lead to a mismatch between the individual's concepts and the concepts of science or scientists ([Silviani et al., 2020](#)). Misconceptions can also be in the form of erroneous initial concepts and errors in connecting concepts ([Inggit et al., 2021 & Soeharto, 2019](#)).

Misconceptions experienced by students can stem from several factors, including the students themselves. These factors are interconnected with the initial knowledge or preconceptions held by students, cognitive developmental stages that may not align with the concepts being studied, limited and erroneous reasoning abilities of students, challenges in comprehending and grasping learned concepts, and varying levels of interest in the concepts being taught ([Manurung et al., 2021](#); [Panggabean et al., 2023](#)), and the low level of concepts' mastery caused the misconceptions ([Putri et al., 2017](#)).

Student misconceptions occur at almost every level of education, including in junior high school. Identification of student misconceptions is crucial for the future student learning process. If the misconceptions are checked, it will affect the student's learning process, and they will find it easier to understand further concepts. So, the students' conceptions become meaningless because they cannot be connected with previous concepts. The number of misconceptions experienced by students in studying science is because much of the material is abstract, so students need help understanding the correct concept. One abstract physics material is electrical material ([Trisnawati et al., 2020](#)).

Students often possess pre-existing notions of science, which they typically acquire from personal experiences, parental influence, their environment, and previous education received during formal learning processes. These initial concepts

held by students may need to align with the concepts established by scientists. Such initial concepts, derived from prior experiences and education, which do not correspond to scientific concepts, are commonly referred to as misconceptions that tend to persist over time ([Didik & Aulia, 2019](#)). Despite being incorrect, these initial student ideas can sometimes explain the real-life problems they encounter.

There are multiple strategies to assist students in reducing or overcoming misconceptions. Since student errors can vary, individualized approaches are necessary for each student. Therefore, teachers must be aware of and understand the specific misconceptions encountered by their students. Teachers should have some stages in planning learning activities to run well. The teacher is the most crucial role in education ([Jannah et al., 2022](#)). Teacher's skill in improving student engagement and limiting disruptive behavior is essential for maintaining a safe, productive, and effective learning environment ([Octavia et al., 2022](#)). The creativity of educators is very influential in achieving learning goals ([Sihombing et al., 2022](#); [Simatupang et al., 2023](#)). Using appropriate media is an alternative way for teachers to present abstract science concepts. Interactive multimedia is an alternative effort teachers can choose to present science concepts at the macroscopic, microscopic, and symbolic levels because interactive multimedia combines animation, images, text, audio, and video. According to a study conducted by [Halim et al., \(2020\)](#), the research findings demonstrate that using interactive multimedia reduces students' misconceptions by 60.34% for each concept.

VideoScribe is an animated video application simulating a whiteboard with hand gestures or animations. It is an interactive audio-visual medium that offers captivating visual content. VideoScribe is a remarkable software tool utilized for creating dynamic animated videos. One notable advantage of VideoScribe is that it facilitates enhanced comprehension of the materials presented by teachers, making it more accessible for students ([Manzilinia et al., 2020](#)).

Based on this background, this study aims to investigate the factors contributing to students' misconceptions regarding electrical potential and ECG (electrocardiogram) topics. Additionally, the study aims to analyze and assess the effectiveness of interactive audio-visual media, specifically VideoScribe, in reducing misconceptions about electrical potential and ECG concepts.

## Research Method

This research is an R & D (Research and Development). The development model used is the ADDIE development model developed by [Branch \(2009\)](#). In the ADDIE development model, there are five stages, namely: (1) analysis, (2) design, (3) development, (4) implementation and (5) evaluation. The location where we conducted the research was SMP Hang Tuah 2 Medan, and the time of the academic year 2023 in the odd semester. The research subjects in this study were 17 students in 9th grade, then interviewed a science teacher related to the researcher. The summary of ADDIE Design Model activities is in Table 1.

Table 1. Summary of ADDIE Design Model Activities

Development Stages	Activity
Analyze	<ul style="list-style-type: none"> <li>Curriculum analysis</li> <li>Student misconceptions</li> <li>Need analysis</li> </ul>
Design	<ul style="list-style-type: none"> <li>Develop materials that are in accordance with learning objectives.</li> <li>Setting up the VideoScribe app.</li> <li>Define other supporting applications.</li> <li>Design videos by looking for various kinds of animations according to the material.</li> </ul>
Development	<ul style="list-style-type: none"> <li>Start making products with appropriate materials/materials, tools.</li> <li>Continuing the framework obtained from the design stage to the development stage.</li> <li>Validation of developed products.</li> </ul>
Implementation	Starting to use a new product in learning or in the intended junior high school 9 <sup>th</sup> grade.
Evaluation	Conducting a final evaluation according to the suggestions and processing the data obtained.

The procedure in research is a method carried out systematically from the beginning to the end of this research. In this study, the procedures used are as follows:

1) Pre Survey

It is conducted by observing and conducting interviews with science teachers related to research. In addition, researchers also took pictures or supporting documentation that existed at the school.

2) Constructing Instruments

Construct a research instrument in the form of a questionnaire on this research topic interview guidelines and make the questionnaire into a Google Form so that students can fill out the answers online.

3) Survey and Observation

In this study, researchers observed how using VideoScribe reduces misconceptions among students about electricity potential and ECG. Meanwhile, interviews were conducted with the science teachers at the school and several students to discover the problems the researchers raised. Then, a questionnaire was given to students, with a total of 25 questions using a Likert scale to measure the data at the time of the study.

The following are the instruments used in the research at each stage:

1) Observation Guidelines

Observation guidelines are carried out by going directly to the field, whose purpose is to collect data by asking themselves about the object being studied.

2) Interview Guidelines

Interviews rely on interactive methods in which mutual learning occurs between those involved in the interview process ([Young et al, 2018](#)). The interview guide was structured using open-ended questions. Interview guidelines were used in the preliminary research. Guidelines are used to obtain directed information from sources according to research needs.

### 3) Questionnaires Guidelines

The questionnaire is a data collection technique that gives respondents a set of questions or written statements to answer ([Sugiyono, 2017](#)). An open questionnaire is a questionnaire that is presented in such a way that the respondent can provide information according to his wishes and circumstances. The mixed questionnaire is a combination of open and closed questionnaires. The questionnaire used in this study was closed and given to students online via Google Forms. The questionnaire was used to reveal data on the use of VideoScribe to reduce misconceptions of students in electricity potential and ECG by measuring the Likert scale with four alternative answers: 4 (Strongly agree), 3 (Agree), 2 (Less agree), and 1 (Disagree).

This research analysis is a description or explanation using a table. The data were grouped and analyzed based on the answers to the questionnaires obtained from the respondents' responses using data tabulation. This analysis will explain the actual condition of each variable. The process of this analysis is as follows:

#### 1) Data Verification

That is re-checking the questionnaire the respondent has filled out to ensure whether the respondent has answered all statements.

#### 2) Measurement Scale

The measurement scale used is the Likert scale, which is used to measure response to material presentation, response to the attractiveness of Sparkol VideoScribe's video display, response to convenience, response to decreasing material misconceptions with using VideoScribe to reduce misconception in material electricity potential and ECG. To reduce the impact of bias and the occurrence of data convergence during analysis, the scale used is 4 (Strongly agree), 3 (Agree), 2 (Less agree), and 1 (Disagree).

#### 3) Variables in Research

The measurement scale used is the Likert scale, which is used to measure response to material presentation, response to the attractiveness of Sparkol VideoScribe's video display, response to convenience, response to decreasing material misconceptions with using VideoScribe to reduce misconception in material electricity potential and ECG. To reduce the impact of bias and the occurrence of data convergence during analysis, the scale used is 4 (Strongly agree), 3 (Agree), 2 (Less agree), and 1 (Disagree).

#### 4) Calculating Respondent's Answer Value

The number of respondents is 15 people, with the most significant measurement scale being four and the minor measurement scale being 1, so that the cumulative number is  $15 \times 4 = 60$ , with the smallest cumulative number  $15 \times 1 = 15$ . The most considerable percentage value is  $(60:60) \times 100\% = 100\%$ . In contrast, the smallest percentage value is  $(15:100) \times 100\% = 15\%$ . The range value is  $100\% - 15\% = 85\%$ . If the range value is divided by four measurement scales, it will get a presentation interval value of 21.25%. The description of the percentage is as follows:

- Minimum score =  $1 \times 15\% = 15\%$
- Maximum score =  $(60 : 60) \times 100\% = 100\%$
- Range =  $100\% - 15\% = 85\%$

So that the classification of the percentage assessment is obtained as follows:

**Table 2. Score Interpretation Category**

Score Percentage	Qualification
>81,25%-100%	Very good
>62,50-81,25%	Good
>43,75%-62,50%	Enough
25%-43,75%	Not good

### Finding and Discussion

The research results on the response to the development of learning media are summarized in Table 3.

**Table 3. Categorizing Aspect Indicator Scores into Intervals**

Aspect	Percentage	Category
I (response to material presentation)	80,20%	Good
II (response to the attractiveness of sparkol VideoScribe's video display)	84,25%	Very Good
III (response to convenience)	80,81%	Good
IV (response to decreasing material misconceptions on material Electricity Potential and ECG)	79,40%	Good

Based on Table 3, the findings indicate that the first indicator of the response to material presentation falls within the "good" category. This conclusion is supported by the indicator's percentage, which is 80.20%. As for the second indicator, the response to the attractiveness of Sparkol VideoScribe's video display is classified as "very good," with the highest percentage recorded at 84.25%. Similarly, the response to convenience, representing the third indicator, is categorized as "good" with a percentage of 80.81%. Lastly, the fourth indicator is also classified as "good," with a percentage of 79.40%.

#### A. Response to Material Presentation

The results indicate that the response to the material presentation falls within the "good" category, with a percentage of 80.20%. It demonstrates that students positively engage with the presented material in Sparkol VideoScribe, which ranges from easy to complex content. The presented material is coherent and comprehensive, aligning with the subject matter covered in a single session. Using images, text, music, and sound recordings in this application enhances student satisfaction and interest in learning.

According to [Febrianto & Shalikhah \(2020\)](#), VideoScribe media aids students in understanding learning material due to its unique and captivating animations that make the learning process more enjoyable. Using VideoScribe as a learning medium sparks curiosity among students, a finding supported by Ismail et al. Furthermore, incorporating images, animations, sounds, and attractive designs in VideoScribe simplifies students' comprehension of lessons, accelerates message delivery, and

improves retention, resulting in a more effective teaching and learning process ([Jannah, 2019](#)).

### **B. Response to the Attractiveness of Sparkol VideoScribe's Video Display**

The response to the attractiveness of Sparkol VideoScribe's video display is classified as "very good," with the highest percentage of 84.25%. This finding indicates that Sparkol VideoScribe captures students' attention through its visually stimulating display. This observation aligns with the research by [Imamah & Ma'ruf \(2018\)](#), highlighting the diverse features of VideoScribe that make it an innovative learning medium suitable for various subjects. By incorporating appealing images, sounds, and designs, Sparkol VideoScribe enhances students' engagement and enjoyment during learning.

VideoScribe, as an audio-visual learning medium, offers several advantages. These advantages include focusing students' attention, facilitating repetition and reinforcement, clarifying abstract concepts, and providing explanations that are easier to remember. The combination of text, images, audio, music, and visuals within VideoScribe contributes to achieving the learning objectives.

### **C. Response to Convenience**

Improving materials to address misconceptions is a critical element in efforts to improve student understanding in various disciplines. Misconceptions tend to be persistent and often deeply ingrained in students' minds, posing a significant barrier to effective learning. To address this issue, educators have focused on actively developing learning materials designed to confront and correct these misconceptions. The response to convenience is classified as "good," with a percentage of 80.81%. It indicates that Sparkol VideoScribe creates an enjoyable learning experience for students studying electric potential and ECG materials. Its engaging animations are accompanied by pleasant music.

Student responses can assist educators in improving and customizing learning modules to be more effective in addressing misconceptions. By actively involving students in evaluating and developing learning media, educators can ensure that the materials provided align with students' needs and understanding ([Heny et al., 2018](#)). Student responses are a tool to improve learning materials and strengthen the relationship between educators and students, creating a more collaborative learning environment and effectively addressing misconceptions ([Salamah, 2020](#)).

According to [Rahayu et al., \(2022\)](#); [Manzilina et al., \(2020\)](#), VideoScribe possesses various characteristics that contribute to its effectiveness as a learning tool. These include the ability to present images, animations, sounds, text, and appealing designs, which facilitate students' understanding of the taught content and enhance message retention. Moreover, VideoScribe promotes critical thinking skills by presenting real-life problems that pique students' curiosity and require them to think critically ([Saptono et al., 2023](#)). The learning videos based on Sparkol VideoScribe explain problem-solving techniques through dynamic images, text, and animations.

In summary, VideoScribe offers advantages such as capturing students' attention during teaching and learning, resulting in more effective learning

outcomes. The media's ability to convey information through sound, images, movement, and color ensures that the subject matter is presented comprehensively and in a manner that engages students' interest. VideoScribe fosters active student participation in the learning process by stimulating curiosity and evoking physical and emotional responses.

#### **D. Response to Decreasing Material Misconceptions**

The response to reducing misconceptions in electric potential and ECG material is classified as "good" with a percentage of 79.40%. It indicates that students better understand the electric potential and ECG concepts using Sparkol VideoScribe than textbooks. Often dense with written content, textbooks can discourage students from reading them, leading to a decreased understanding of the subject matter. It highlights the crucial role of audio-visual elements in learning media. According to [Imamah & Ma'ruf \(2018\)](#), VideoScribe media possesses characteristics that are advantageous for learning, particularly as an audio-visual media. These advantages include focusing students' attention during learning activities and providing effective stimuli. Visualizing complex concepts like electric potential and ECG through images and sound makes learning more enjoyable.

Improving materials to address misconceptions is a critical element in efforts to improve student understanding in various disciplines. Misconceptions tend to be persistent and often deeply ingrained in students' minds, posing a significant barrier to effective learning. To address this issue, educators have focused on actively developing learning materials designed to confront and correct these misconceptions. ([Yolviansyah et al., 2022](#); [Nasrudin & Azizah, 2020](#)).

Material improvement of misconceptions through learning media is relevant in today's education. High-quality learning media, such as interactive learning videos, simulations, and learning software, can help students understand complex concepts more visually and interactively ([Widyawati et al., 2019](#)). Improving misconception materials in science lessons can be achieved through learning media such as Videoscribe. The study [Silfiani et al., \(2022\)](#) tried to measure the impact of Videoscribe in reducing students' misconceptions in physics lessons. The results of this study show that the use of Videoscribe is efficacious in improving concept understanding and reducing misconceptions. In addition, Videoscribe can allow students to participate in learning actively. They can produce animated videos to explain science concepts, which in turn can force them to understand and communicate the concept more in-depth ([Bahrun et al., 2023](#); [Pranata & Jayanta, 2021](#)).

The student responses indicate that using Sparkol VideoScribe effectively reduces misconceptions related to electric potential and ECG, which were previously challenging for students to grasp. Research by [Fitria \(2017\)](#) supports using audio-visual media in learning, as it engages students' visual and auditory senses, facilitating their comprehension of the material presented in the videos. Audio-visual media aims to enhance cognitive abilities by providing stimuli through moving images and sounds, influencing attitudes and emotions. It enables students to



comprehend scientific concepts accurately and effectively and reduces misconceptions in the learning process.

### Conclusion

Based on the results obtained from the development of Sparkol VideoScribe learning media, it can be concluded that the first indicator, which pertains to the response to material presentation, falls within the "good" category. This conclusion is supported by the indicator's percentage, which is 80.20%. As for the second indicator, the response to the attractiveness of Sparkol VideoScribe's video display is categorized as "very good," with the highest percentage recorded at 84.25%. Similarly, the response to convenience, representing the third indicator, is considered "good" with a percentage of 80.81%. Finally, the fourth indicator is also classified as "good," with a percentage of 79.40%.

VideoScribe makes teaching more engaging, increasing students' motivation and eliminating boredom. It also helps train students' thinking levels, progressing from concrete to abstract and simple to complex thinking. With VideoScribe, students can simultaneously incorporate visual elements, relate the overall visual message to their own experiences, draw conclusions based on the visualizations they observe, and subsequently develop new conceptualizations of their previous learnings.

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