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Research Artikel

TRENDS IN THE DEVELOPMENT AND USE OF INTERACTIVE MULTIMEDIA FOR PHYSICS LEARNING: A SYSTEMATIC LITERATURE REVIEW

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Abstract
While research on interactive multimedia in physics education is abundant, a systematic review of its development and implementation trends remains scarce. This study aims to address this gap by investigating these trends through a Systematic Literature Review (SLR) with the PRISMA stages using bibliometric analysis. A total of 32 scientific articles from 2016–2025 were selected based on the Scopus (Q1–Q4) and SINTA (1–3) indexes to ensure quality and reliability. The results of the study show that the use of interactive multimedia fluctuates, with a significant spike in 2020 due to the COVID-19 pandemic which encouraged online learning. The impact of the use of interactive multimedia in physics learning is very diverse, along with the development of technology that allows for increasingly sophisticated and varied multimedia designs. The most widely studied physics topic is mechanics, given its role as a basis for understanding other physics topics. The implications of this study indicate that SLR research is capable of providing an up-to-date mapping of the development of interactive multimedia in physics learning while revealing research gaps, particularly the limited integration of artificial intelligence (AI) and testing of the effectiveness of multimedia implementation, as well as the lack of research studies using interactive multimedia in physics subjects such as temperature-heat and momentum-impulse.

Keywords: *Interactive Multimedia, Physics Learning, Systematic Literature Review (SLR)*

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INTRODUCTION

Framework The 21st century requires humans to have skills, expertise, and scientific knowledge in order to succeed in the world of work and life (Adeyele, 2024; Ma'ruf *et al*, 2021). Meanwhile, in this century, the world order has begun to evolve towards the development of neurotechnology, which in the world of education has triggered new ways of processing information in the human brain (González-pérez & Ramírez-montoya, 2022). As a result, technology plays a vital role in education as a learning tool to ensure quality and engagement (Abdulrahaman *et al*, 2020). The rapid development of technology has encouraged educators to innovate and create more interactive and meaningful learning approaches that are sensitive to technological developments, especially in physics education.

However, it is often known that physics material is abstract, very difficult, and so complex that it is not easy for students to understand it (Latifah *et al*, 2024). In addition, learning that does not interact much with technology reduces students' motivation to learn (Melinda *et al*, 2021; Nawahdani *et al*, 2022). As stated by (Ihsan *et al*, 2024), physics learning is difficult, especially in fluid material, and 14.43% of students have very low learning motivation due to lack of interaction with technology (Melinda *et al*, 2021). If not handled properly, the quality of learning will be low and not as expected (Ilahi *et al*, 2021). However, If students are able to master the material, the learning objectives can be achieved (Rose *et al*, 2024). In reality, many studies prove that student learning outcomes are still below standard (Halmuniati *et al*, 2022). This makes it important to create changes in the teaching and learning process. Especially now with the rise of learning systems such as feedback, flipped learning, online learning, and so on, the use of multimedia is no less popular (Davis, 2013; Hill *et al*, 2015; Lebedev *et al*, 2021; Yeung *et al*, 2016) which makes learning more interactive and learner-centered so that learners are more active in the learning process (Coleman *et al*, 2016; Lebedev *et al*, 2021). This makes the use of interactive multimedia very appropriate in utilizing technology well in education.

Interactive multimedia is a combination of various types of media, including audio, text, video, images, simulations, and animations, whose characteristics can interact creatively, enabling someone to communicate information or ideas through digital or print elements and create diversity and integration (Abdulrahaman *et al*, 2020). Interactive multimedia components can combine other links to gather information quickly and are capable of displaying/activating navigation buttons (Ma'ruf *et al*, 2021). Interactive multimedia can be a very effective and interesting learning tool (Daryanto, 2016; Ilahi *et al*, 2021) like other tools or media, but its use must be designed and implemented appropriately (Adeyele, 2024; Rose *et al*, 2024; Lebedev *et al*, 2021; Abdulrahaman *et al*, 2020; Stelzer *et al*, 2009; Mayer, 2005; Muller & Sharma, 2005; Mayer & Moreno, 1998). Therefore, considering that physics material is generally abstract and requires visualization to facilitate students' understanding, research by (Ihsan *et al*, 2024) provides a solution through the development of interactive multimedia that is declared to be highly valid for visualizing abstract concepts in fluid material.

To date, the contribution of interactive multimedia in the development of physics learning has played a significant role in creating more impactful learning for students. The variety of interactive multumedia products that contribute to physics learning is becoming increasingly sophisticated, including technological tools such as Sigil software (Manurung, 2020), Adobe Flash & Camtasia (Oktafiani *et al*, 2020), Mobile Learning (Zulham, 2020), Macromedia Director (Melianti *et al*, 2020), platform (RedCAP) (Lebedev *et al*, 2021), SWiSHMax & ActionScript 2.0 (Sari *et al*, 2021), PowerPoint

& macromedia flash (Ilahi *et al*, 2021), Adobe Flash CS 6 (Hasanati *et al*, 2021), ICT Integration, Cronbach's alpha, Gadgets, and computers (Mundo & Caballes, 2022), Adobe Animate CC (Aini & Mufit, 2022; Ardini & Mufit, 2022), Power Point (Rahayu & Agustiana, 2023), Scratch (Ma'rifah *et al*, 2023), and Articulate Storyline 3 software (Asrizal *et al*, 2025). The creation of interactive multimedia using various technologies has contributed to a range of physics topics such as waves, fluids, optical instruments, changes in the state of matter, work and energy, mechanics, vectors, rotation and equilibrium, and thermodynamics. This shows that interactive multimedia over the past 10 years has made a real contribution to physics topics. Furthermore, the forms of interactive multimedia have become more diverse, with designs ranging from approaches such as inquiry, (Sari *et al*, 2021; Ajizi *et al*, 2018), problem-based learning model (Rahayu & Agustiana, 2023), and the Visual Auditory Kinesthetic Model (Rose *et al*, 2024)), problem-solving-based (Liana & Nursuhud, 2020), cognitive conflict (Aini & Mufit, 2022; Ilahi *et al*, 2021), conflict (Ardini & Mufit, 2022), integrated STEM (Asrizal *et al*, 2025), HOTS-oriented (Ihsan *et al*, 2024), contextual (Zulham, 2020), problem-based (Gunawan *et al*, 2019), and scientific (Najamuddin *et al*, 2016). It is important to conduct an in-depth investigation to determine the contribution of interactive multimedia in physics learning over the past 10 years using a Systematic Literature Review (SLR) approach.

Previous studies have examined trends in the development of multimedia in physics learning, covering both interactive and non-interactive multimedia (Ma'ruf *et al*, 2021). However, the studies were still limited to trends in the use of multimedia in learning in Indonesia. More specific studies on interactive multimedia in physics learning and broader studies on an international scale have not yet been conducted. Therefore, researchers are very interested in exploring these studies, namely trends in the development of interactive multimedia in physics learning on an international scale. This international-scale study will expand information on the development of interactive multimedia use. This will be beneficial for academies and education stakeholders in implementing and evaluating learning to be even better. In addition, the trend study conducted by (Putri & Mufit, 2023) only focuses on the trend of the effectiveness of interactive multimedia use in 4C skills, without examining all aspects of students' abilities in using interactive multimedia.

This study aims to describe the perspectives and impacts of using interactive multimedia in physics learning in terms of research methods, measured dependent variables, measured physics topics, and forms of interactive multimedia, which are reviewed systematically and comprehensively.

METHOD

This study uses the Systematic Literature Review (SLR) method to identify and analyze trends in the development and utilization of interactive multimedia in physics learning. The review process was conducted based on the PRISMA 2020 protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The procedure was carried out in a structured and comprehensive manner in the selection and search for literature, identification, assessment, and synthesis of all studies relevant to a specific topic (Petticrew & Roberts, 2008).

Literature Search Strategy

Data sources were obtained from several reputable databases such as Scopus, Google Scholar, and DOAJ, as well as additional sources such as SpringerLink, Wiley Online, and IOP Publishing. The search was conducted using Publish or Perish (PoP) software. Search keywords were compiled in Indonesian and English, using a combination of Boolean operators :

- "*Interactive multimedia" AND "physics learning"*
- "Multimedia interaktif" AND "pembelajaran fisika"
- "Interactive multimedia" AND (*mechanics OR fluid OR thermodynamics OR heat OR optics OR Newton OR momentum OR energy OR wave*)".

The search was conducted for publications between January 2016 and Aprıl 2025, with restrictions on published and peer-reviewed journal articles. The initial search of various databases yielded 422 articles. The literature search was part of the initial stage of this study, namely identification.

Inclusion and Exclusion Screening

The next stage in this research was screening and selection to ensure the quality, relevance of the research, and objectivity in screening articles, which required inclusion criteria and quality assessment. Articles that did not meet the inclusion criteria had to be discarded. The inclusion and exclusion criteria in this literature screening stage were as follows :

Tablel 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Articles focus on the use of interactive multimedia in physics education	Articles not originating from journals (e.g., theses, dissertations, proceedings, and books)
Published in journals indexed by Scopus (Q1-Q4) or Sinta (1-3)	The article is not relevant to the topic of interactive multimedia in physics
Published between 2016 and 2025	The article is a duplicate, does not have full access, and/or is not in Indonesian/ English

Data Analysis and Classification

In addition, in the final stage, which had passed the inclusion and exclusion criteria, the researchers conducted a study on previous articles that met the criteria. The previous articles were in the form of SLR research conducted by (Putri & Mufit, 2023), which found that there were four articles that met the criteria and were included in the research review report. This review is permitted in the PRISMA method to ensure continuity and completeness of literature mapping (Page *et al*., 2021). The selected articles were analyzed qualitatively and quantitatively. The coded data included: author name, vear of publication, physics topic studied, interactive multimedia format used, type of research method, and learning outcome variables analyzed. Keyword trend visualization was performed using VOS viewer software.

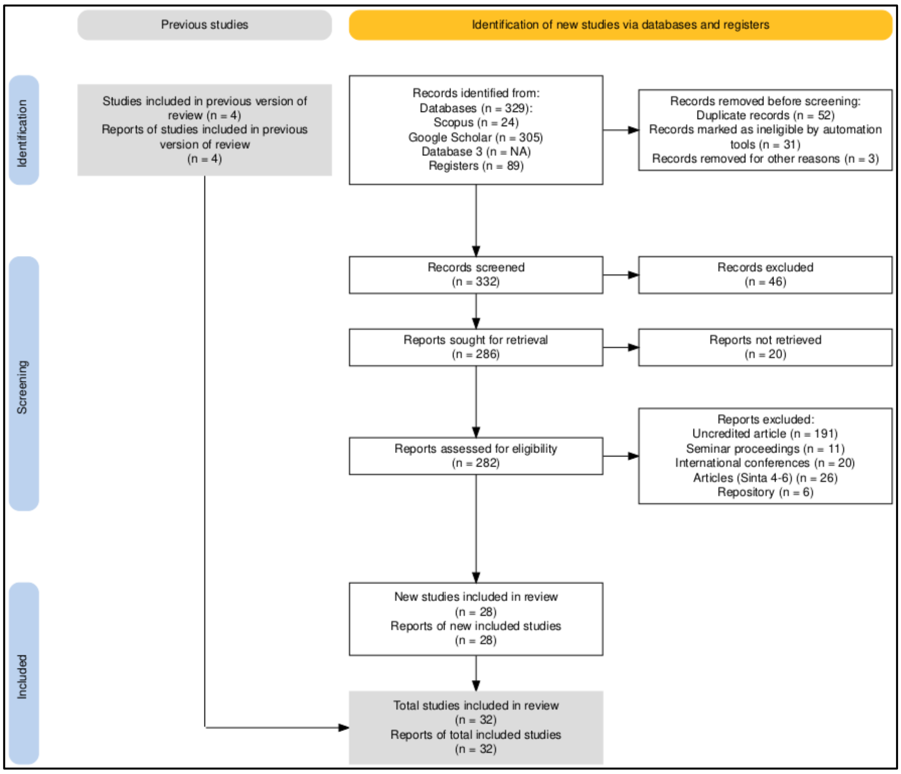

Figure 1. PRISMA Method

The final result of screening articles accredited by Sinta and Scopus was 32 articles, as grouped in Table 2. Most of these articles were published in national journals, namely in Sinta 2 and 3. Meanwhile, the articles with the highest reputation were published in Q3 indexed journals. Of the 6 articles with the highest reputation, 2 studies were conducted abroad, namely in Australia with a Q3 journal index and in the Philippines in a Q4 journal.

Table 2. Journal Index

Journal	Number of Articles
Q2	1
Q3	4
Q4	1
Sinta 2	9
Sinta 3	17
Total	32

RESULTS AND DISCUSSION

Data on the development of interactive multimedia research

The development of research on the use of interactive multimedia in physics learning that has undergone inclusion and exclusion screening from 2016 to 2025 is as follows:

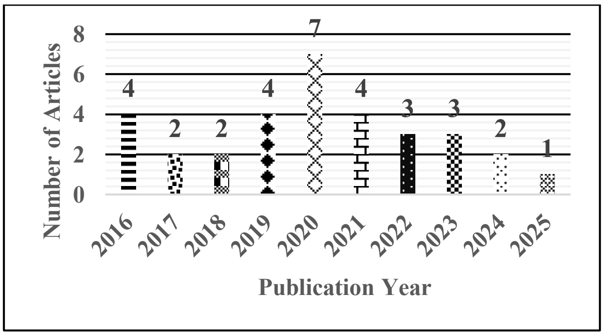

Figure 2. Publication of interactive multimedia articles in physics learning from 2016 to 2025

Most of the articles were published in national journals, with a small number published in reputable journals. Figure 2 shows that research on interactive multimedia in physics learning from 2016 to 2025 fluctuated. In 2016, there was the second highest number of studies after 2020, and then a decline until 2018. This could be due to increasing needs, such as the lack of optimization of ICT use in learning (Djamas *et al*, 2016; Najamuddin *et al*, 2016) and below-standard learning outcomes (Djamas *et al*, 2016). The period of 2017-2018 saw a decline in interactive multimedia research, possibly due to reduced demand in the field and teachers becoming more skilled in the use of increasingly advanced digital technology. However, in 2019, there was an increase again, with the highest surge occurring in 2020. This could be due to the impact of COVID-19, which forced all elements to adapt to digital technology. For example, learning had to be conducted remotely, so the use of interactive multimedia was very much needed during the COVID-19 pandemic as a solution for online learning (Santhalia & Sampebatu, 2020). However, in the 2021-2025 period, there was a decline due to learning returning to normal or stable and the impact of COVID-19 decreasing again. The results of a review of two articles published in 2024 indicate that some schools still implement conventional learning methods, which only involve question and answer sessions with students, resulting in low learning outcomes (Rose *et al*, 2024). In addition, there may be other variations in the use of digital technology, so that multimedia is no longer used or developed in depth for research.

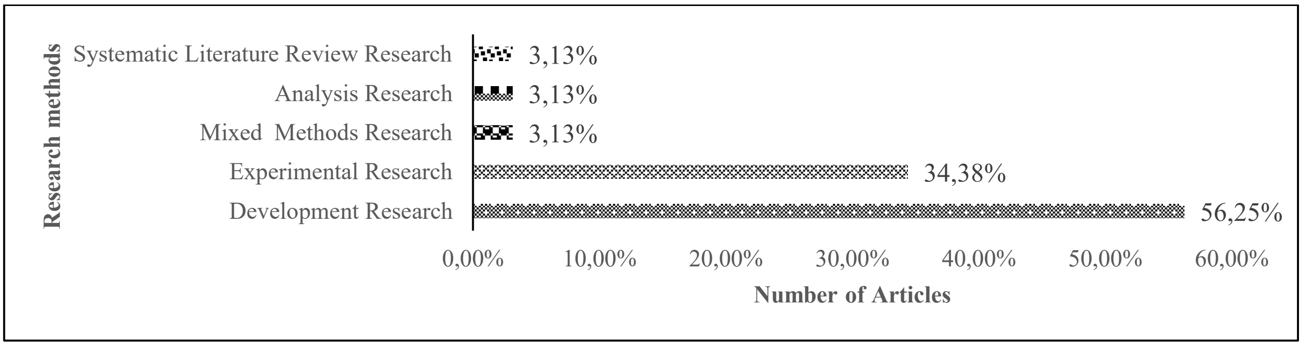

Figure 3. Analysis of Research Methods

The research method that dominates interactive multimedia research in physics education is development research, with a percentage of 56.25%. Meanwhile, experimental research ranks second with 34.38% of articles. Future research opportunities can be identified by examining the research gap and assessing the impact of the developed multimedia. This is in line with the statement (Suwasono *et al*, 2024) that when there are many development studies, future researchers can continue their research by examining the application or impact of the products created in learning. These opportunities could include combining interactive multimedia with learning models, as done by (Qoni'ah *et al*, 2020; Mustofa, 2018; Yulianci *et al*, 2017), or simply observing its effectiveness measuring the desired dependent variables (learning outcomes, concept understanding, concept mastery, and so on). Meanwhile, the opportunities in terms of research, as seen in Figure 3, are in SLR, analysis, and mixed methods research, each of which only accounts for 3.13% with a total of 1 article, including (Putri & Mufit, 2023; Lebedev *et al*, 2021; Djamas *et al*, 2016). This presents a significant opportunity for further research on interactive multimedia in physics education using these research methods.

Physics Topics Studie

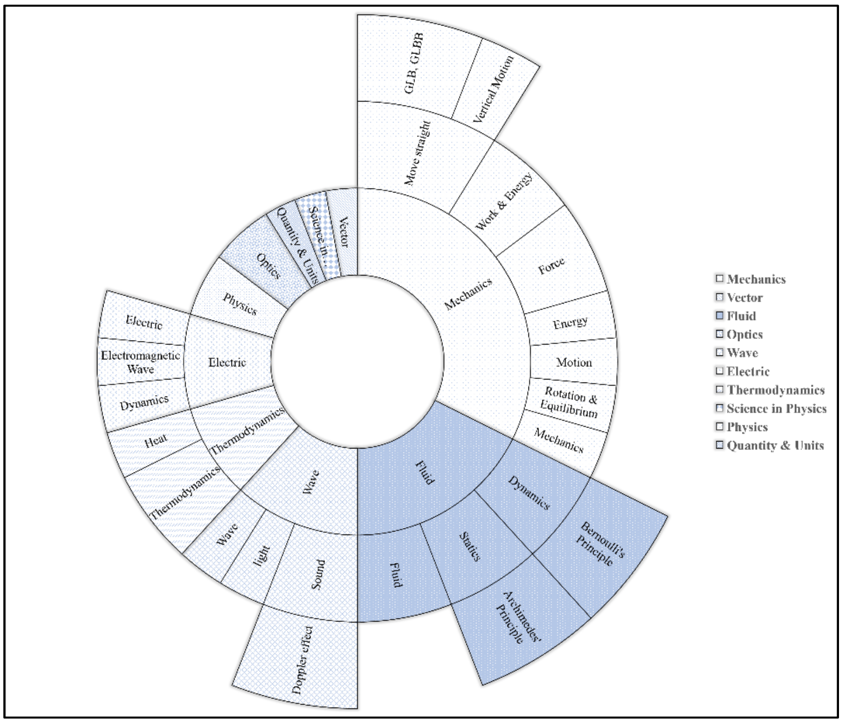

Figure 4. Physics Topics

Figure 4 shows that the research using interactive multimedia with the most research topics is the grouping of topics in Mechanics. Considering that these topics are so abstract that they require visualization to support learning so that students can easily understand and digest the concepts of the material, the use of interactive multimedia is very important in learning, as done by (Aini & Mufit, 2022). This is also supported by previous research that many students still have a low level of understanding of this material, especially the material on linear motion (Capriconia & Mufit, 2022), as well as the material on electricity (Utama *et al*, 2024). Meanwhile, for topics with only one study, this presents an opportunity for future research to delve deeper into these topics using interactive multimedia, whether through developmental or impact studies. Additionally, there are still many physics topics that have not been explored or studied using interactive multimedia in studied using interactive multimedia in reputable journals, such as temperature, momentum & impulse, and others.

Measured Variables

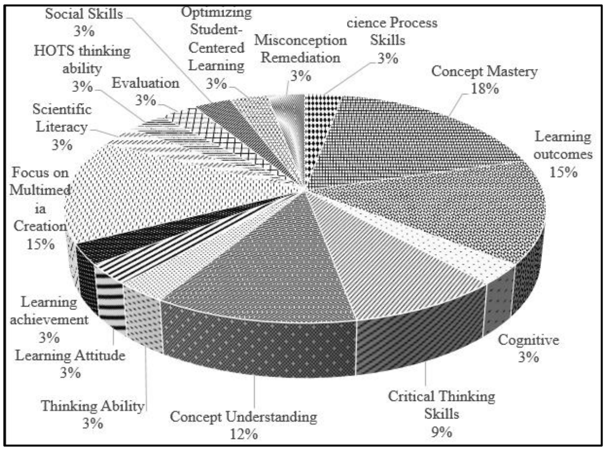

Figure 5. Analysis of Measured Variables

Based on Figure 5, it can be seen that most studies using interactive multimedia in physics learning have focused on outcome-related variables, such as concept understanding (12%), learning outcomes (15%), critical thinking skills (9%), and concept mastery (18%). The highest focus is even shown on the creation of multimedia itself to check its validity and effectiveness, which reaches 15% (Anas, 2019; Ihsan *et al*, 2024; Ilahi *et al*, 2021; Melianti *et al*, 2020; Oktafiani *et al*, 2020; Sari *et al*, 2021; Wulandari *et al*, 2019). Meanwhile, other variables such as science process skills, cognitive skills, thinking skills, learning achievement, learning attitudes, Hots thinking skills, social skills, science literacy, misconception remediation, evaluation, and optimization of learner-centered learning only received a very small portion, each below 3%, meaning that they are still rarely studied. Furthermore, these findings indicate that the research that has been conducted tends to place interactive multimedia solely as a tool to achieve students' cognitive achievements. This means that most studies focus more on the extent to which interactive multimedia can improve learning outcomes, without exploring the internal processes that students go through during learning. Psychological variables, such as learning motivation, self-efficacy, engagement, or self-regulated learning, are still rarely used as the main focus of research. In fact, these aspects have great potential as mediator or moderator variables that can clarify the working mechanisms of interactive multimedia in improving learning outcomes.

Research Subject Area

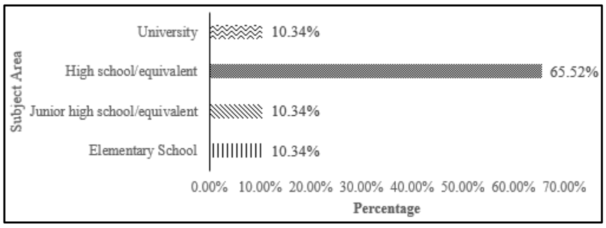

Figure 6. Distribution of Interactive Multimedia

Figure 6 shows a graph of the target subjects used to measure the effectiveness and influence of interactive multimedia at various levels of education. The graph shows that senior high school dominates the target testing of interactive multimedia. The physics curriculum at the senior high school level is more complex and crucial, making it important to use the right media, such as representations (Latifah *et al*, 2024). Representation components are included in multimedia, making the use of interactive multimedia very important in physics learning. One example of interactive multimedia that includes representation component is (Manurung, 2020). His research shows that interactive multimedia development can improve critical thinking skills in high school students.

The second-ranked research used interactive multimedia as the subject for elementary school (SD), junior high school (SMP)/equivalent, and university students, with the same percentage of 10.3%. This does not mean that it is not important for us to study because all levels of education certainly need multimedia in learning motivation so that students do not get bored easily and/or other things, thereby achieving learning objectives.

Forms of Interactive Multimedia

The forms and other technological tools used in interactive multimedia to make it more interactive and appealing to students are shown in Table 3 and Figure 7.

Table 3. Trends in Components and Use of Technology Tools in Interactive Multimedia

Author	Components	Technological Tools	Innovation Gap
(Gunawan et al., 2016)	Text, animation, simulation, video, and audio, graphics	Adobe Flash Player 9.0	
(Najamuddin *et al*, 2016)	Animation, text, graphics, animation, images, audio, and video.		Scientific Approach
(Ajija *et al*, 2016)	Text, audio, animation, graphics, simulation, and video.		Interactive Multimedia Model
(Mazlina & Annisa, 2017)	Text, audio, Flash animation, graphics, simulation, and video.		
(Ajizi *et al*, 2018)	Visual and audio media and feedback	Computer Representation	Based on inquiry model
(Mustofa, 2018)	Text, graphics, animation, images, videos, games, practice questions, feedback, Q&A, and audio with a combination of links and navigational tools.		Interactive multimedia in remedial learning
(Gunawan *et al*, 2019)	Text, audio, animation, graphics, image.and video.		Problem-based
(Diyana *et al*, 2019)	Image, online assessment, and feedback	Powerpoint	Measuring *Student-Centered Learning* with the following format: *Goal, Check Your Knowledge, Explanation, Get the Feedback, Test, About Product dan About Developer*
(Anas, 2019)	Text, audio, image, dan video, Drills, simulasi, Instructional Games		Application system development
(Wulandari *et al*, 2019)	Image, animation, ilustration, audio dan video, pictures, movies, storyboard, navigation buttons, quizzes.	Computer representation that publishes applications in executable file format (.exe)	Interactive multimedia-based science learning application
(Liana & Nursuhud, 2020)	Text, graphics art, sound, animation, video, simulation materials, quizzes.	Computer representation	Based problem solving
(Manurung, 2020)	Practice & exercises, games, tutorials, simulations, audio dan representative	Sigil software	Problem-solving based on interactive multimedia using android
(Santhalia & Sampebatu, 2020)	Image, sound, aminated text, videos with pyperlinks, buttons, and storyboard.	Online-based platform & PowerPoint	Stucture : *home, goal, check your knowledge, explanation, get the feedback, test & about*
(Oktafiani *et al*, 2020)	Animation, games, images, presentations, films, quizzes, and electronic cards, & storyboard	Adobe Flash & Camtasia	Interactive multimedia development
(Qoni'ah *et al*, 2020)	Audio-visual media, videos, materials, exercises, and simple animations.	PowerPoint, internet, and integrated tecnology	Implementation of interactive multimedia with Cooperative Meaningful Instructional Design (C-MID) learning
(Zulham, 2020)	Audio-visual and visual stimuli	Mobile learning using smartphones	Mobile-based with a contextual approach
(Melianti *et al*, 2020)	Images, movies, animations, text, audio, video, and animations.	Macromedia Director	Interactive multimedia using macromedia director
(Lebedev *et al*, 2021)	Video demonstrations, interactive to augmented reality & virtual reality, and YouTube	Embed YouTube links and insert canvas into the platform (RedCAP)	Creating interactive linear multimedia
(Sari *et al*, 2021)	Quizzes, feedback, storyboards in the form of button layouts, images, tables, black test, animations, videos, scripts, virtual laboratories, and worksheets.	SWiSHMax & ActionScript 2.0	Development of interactive multimedia software "Inquiry Play-Room" as an Electronic Learning Resource
(Ilahi *et al*, 2021)	Text, graphics, images, animations, sound, and video, virtual laboratory, teaching modules.	PowerPoint and macromedia flash	Conflict-based Cognitive
(Hasanati *et al*, 2021)	Storyboard, perception, video (traditional games), materials, simulations, and practice questions..	Adobe flash CS 6	Digital module with *goal, knowledge, explanation, recitation program, & test* formats
(Mundo & Caballes, 2022)	Graphics, photos/images, animations, or videos, virtual intelligence, simulastions.	ICT integration, Cronbach's alpha, Gadgets, and computers	Measuring cognitive load levels

(Aini & Mufit, 2022)	Images, animations, sound, text, video, audio, and graphics.	Tools: Adobe Animate CC, laptops, dan smartphones	Conflict-based Cognitive Approach
(Ardini & Mufit, 2022)	kahoot, quizzes, text, images, audio, illustrations, videos, experiments, animations, & virtual labs.	Adobe Animate CC, PowerPoint, and HTML5, CCS3 dan JavaScrip code can provide interactive web code	Conflict-based, specifically on the topic of Optical Tools
(Rahayu & Agustiana, 2023)	Animation, text, audio, image, video, and music	PowerPoint	Problem based learning
(Ma'rifah *et al*, 2023)	Video, animation, attractive colors, and audio	Scratch , laptops, dan android	Interactive multimedia-bassed learning media using scratch
(Rose *et al*, 2024)	Audio, images, video, relaxation music, colorful images, audio podcasts, tournament games, YouTube videos, , quizzes, practical work LKPD, and PhET simulations	YouTube and PhET simulations	Interactive multimedia E-module based on the Visual Auditory Kinesthetic Model
(Ihsan *et al*, 2024)	Audio, video background music, Animation, and images	Smartphone devices with the android operating system	Android-based devices oriented towards higher-order thinking skills
(Asrizal *et al*, 2025)	Simulations, materials accompanied by audio, image, animations, and videos	Articulate Storyline 3 software	Integrated STEM

As the years go by, technological developments are accelerating. The variety of components in multimedia has become more interesting and sophisticated, as shown in Table 3. Multimedia programming can embed other media such as YouTube links. PhET simulations, other websites through or HTML5, JavaScript, or CCS3 to make them interactive (Puri & Wiyatmo, 2024; Ardini & Mufit, 2022). This is in line with the results of research identification by (Abdulrahaman *et al*, 2020) that HTML5, JavaScript, and CSS3 software can program other websites. According to (Abdulrahaman *et al*, 2020), this is high-level programming. Camtasia software is used for screen recording and video editing, as demonstrated by (Oktafiani *et al*, 2020). There is Articulate Storyline 3 software, which is rarely used, but is very suitable for creating interactive multimedia, especially e-learning, because the main components of interactive multimedia are already included in it, such as text, video, audio, images, graphics, animations, and simulations. This software has been used by (Asrizal *et al*, 2025) in their research, which found that the interactive multimedia developed was very effective and influential in improving students' conceptual understanding and literacy.

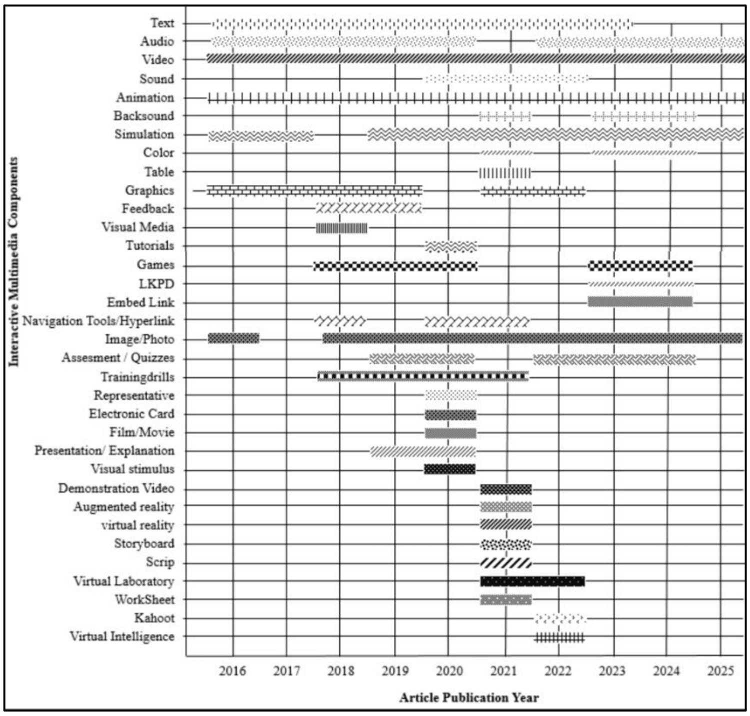

Figure 7. Tren ds in Technology Components

Based on Figure 7, it can be seen that the most phenomenal components are text, video, audio, simulation, graphics, images, and animation. This is in line with the statement by (Abdulrahaman *et al*, 2020) in his research that text, video, animation, audio, and images are the main players. It should be noted that text is the most important communication tool for interacting with others. Therefore, it is not surprising that text continues to be used today.

Furthermore, the most widely used software in the creation of interactive multimedia is computer/laptop representation, which only utilizes the devices available in computers/laptops, as shown in Table 2. However, even though it is only a computer representation, it does not mean that the device is not sophisticated. According to (Abdulrahaman *et al*, 2020), computer representation is a sophisticated device used to create interactive multimedia. One example that shows that computer representation is sophisticated is that it can publish applications in executable file format (.exe) by (Wulandari *et al*, 2019).

Other software variations used to create interactive multimedia include Adobe Flash, whether it be version 9.0, CS 6, or the standard version, as well as Adobe Animate CC, which is used to create interactive multimedia with its own advantages. The latest version of the four types of Adobe software is Adobe Animate CC, which is the most advanced because of its advantage over previous versions in that it can pair HTML5, CCS3, and JavaScript codes to embed external interactive websites, as explained by (Ardini & Mufit, 2022).

In addition, there is Macromedia Director software used by (Melianti *et al.*, 2020) and Macromedia Flash by (Ilahi *et al*, 2021), whose advantages lie in how to create interactive learning multimedia, as Macromedia Director is very accessible and can support all multimedia formats. Meanwhile, Macromedia Flash focuses more on how to create vector animations and web content, which requires more time to complete.

Furthermore, there is SWiSHMax & ActionScript 2.0 software that is no less sophisticated than other software. The use of this software has been researched by (Sari *et al.*, 2021). Sigil software is used by (Manurung, 2020), Scratch software is used by (Ma'rifah *et al.*, 2023) and there are many other software & web applications that can be used in the creation of interactive multimedia, as shown in Table 3.

The current position of research in the field of interactive multimedia in physics education has been highly adaptive to technological developments. However, studies on the integration of interactive multimedia with artificial intelligence (AI) technology are still relatively limited. Therefore, future research should focus on developing AI-based interactive multimedia that is capable of providing adaptive feedback, personalizing learning, and analyzing students' learning needs, thereby supporting a deeper and more effective understanding of physics concepts, especially abstract and complex material.

CONCLUSION

This study reviews previous research on the development of interactive multimedia use in physics learning using the SLR method from the publication period of 2016-2025. Based on the purpose of this review, the use of interactive multimedia in physics learning has fluctuated. Meanwhile, the most dominant research method used was development research with a percentage of 56.25%. Furthermore, considering that physics material is very crucial and abstract in certain subjects, a review was also conducted and it was found that the most studied physics material was the concept of mechanics. Meanwhile, the research subjects were often conducted at the high school level. With the development of digital technology, there are various multimedia components developed by researchers in various forms and formats, so it is not surprising that all 32 articles on the creation of interactive multimedia reviewed were valid and suitable for use. In addition, it is also effective in measuring concept understanding, critical thinking skills, science process skills, learning outcomes, concept mastery, cognitive skills, thinking skills, learning achievement and learning attitudes, Hots thinking skills, social skills, science literacy, evaluation and optimization of learner-centered learning.

Nevertheless, since the first ranking of research forms is in the form of development, it is important for future research to focus on the development of interactive multimedia integrated with AI to respond to the challenges of the times and emphasize research that measures the effectiveness/implementation of the multimedia created, so that the influence of the multimedia is apparent. Additionally, there are physics topics that have not yet been researched using interactive multimedia, such as temperature-heat and momentum-impulse, which also require visualization to make it easier for students to understand the material.

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