



The Effect of Interactive Learning Media on Student Engagement: A Systematic Literature Review

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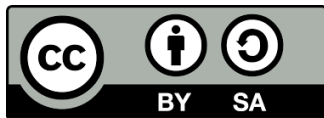
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Abstract

Interactive learning media are increasingly used to create more participatory learning experiences; however, evidence regarding their contribution to student engagement varies across media types and implementation contexts. This systematic literature review synthesizes empirical findings on how interactive learning media influence behavioral, cognitive, and emotional engagement, identifies the types of media reported as effective, and examines the implementation challenges most frequently reported. The review followed a systematic literature review process informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and covered publications from 2021 to 2025. The manuscript reports that 32 candidate articles were retrieved from Google Scholar using search terms related to interactive learning media and student engagement. After title and abstract screening, 12 articles were excluded, leaving 20 studies for narrative synthesis. The reviewed evidence consistently associated interactive media with increased participation, motivation, attention, exploration, and learning interaction. Gamified platforms such as Quizizz and Wordwall were associated with greater active participation and motivation, interactive video supported participation and learning achievement, and virtual reality (VR) provided immersive learning experiences. However, no single medium was consistently superior across contexts; effectiveness depended on alignment with learning objectives, student characteristics, pedagogical design, and implementation conditions. Common challenges included limited infrastructure, educators' digital competence, insufficient institutional support, distraction, and concerns regarding information validity. Overall, interactive media can strengthen student engagement when technology is integrated into a coherent pedagogical design rather than used as an isolated technological intervention.



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INTRODUCTION

Social change, technological development, and the dynamics of life in the 21st century have reshaped the demands placed on education. Education is no longer sufficient when it focuses only on knowledge acquisition and information recall; it must also equip students with the ability to apply knowledge in addressing complex problems. Skills such as critical thinking, creativity, communication, and collaboration (4C) have therefore become important competencies that need to be developed through the learning process.

These competencies require learning processes that actively involve students. Critical thinking is unlikely to develop when students only receive information, just as creativity, communication, and collaboration cannot be developed optimally when students function merely as passive listeners. Student engagement is therefore a fundamental component of

learning oriented toward 21st-century competency development. Student engagement reflects the extent to which students invest attention, effort, thought, and emotional involvement in the learning process (Fredricks et al., 2021). (Csikszentmihalyi, 1975) emphasized that engaged students are not only physically present in the classroom but also demonstrate interest, attention, participation, interaction with the learning environment, and commitment to the learning process.

The importance of student engagement is also consistent with the goals of national education. Law of the Republic of Indonesia No. 20 of 2003 concerning the National Education System emphasizes that education is intended to develop students' potential through learning processes and educational experiences. This perspective indicates that education should not focus solely on knowledge transfer but should also support the development of students' capacities to function and adapt in a continuously changing environment.

The importance of student engagement has become increasingly relevant in the implementation of Deep Learning promoted by the Ministry of Primary and Secondary Education (Kementerian Pendidikan Dasar dan Menengah [Kemendikdasmen]). This approach emphasizes mindful, meaningful, and joyful learning so that students do not merely receive information but actively construct understanding and participate fully in the learning experience. The need for active engagement has also intensified as learning environments have become increasingly digital.

Students now live in environments that provide rapid, diverse, and multimodal access to information. They regularly interact with visual, audio, video, game-based, and digital application content. These changes create challenges for education because students are increasingly accustomed to technology-rich environments. Learning experiences at school must therefore create opportunities for students not only to receive information but also to process, question, connect, and apply it (Putri & Supriyanto, 2021).

However, the need for student engagement is not always reflected in actual classroom practice. In learning environments dominated by one-way information delivery, students may be positioned primarily as recipients of content rather than as active participants in learning (Venton & Pompano, 2021). This can be reflected in low participation in discussions, limited questioning and response, dependence on teacher instructions, low involvement in task completion, and limited initiative to explore learning materials independently (Venton & Pompano, 2021). Engagement problems are not limited to visible behavior but also involve emotional and cognitive dimensions. Students may attend class and complete assignments without demonstrating strong interest, a sense of belonging, meaningful investment, or deep cognitive processing of the learning material (Teng & Wang, 2021).

Student engagement should therefore not be understood solely as an issue of individual motivation. The learning environment, instructional strategies, teacher-student interactions, task characteristics, and learning media can all shape students' engagement experiences. Trowler (2010), as cited in (Apicella et al., 2021), describes student engagement as the interaction between the time, effort, and other relevant resources invested by students and institutions to enhance the student experience, improve learning outcomes, and support educational development. When learning provides opportunities for students to ask questions, explore, discuss, solve problems, produce work, receive feedback, and participate actively,

stronger engagement is more likely to develop. Conversely, learning environments with minimal interaction and limited opportunities for participation may constrain engagement.

The need for instructional innovation has therefore become increasingly important. Technological developments provide opportunities for educators to design learning experiences that not only deliver information but also support interaction among students, learning materials, teachers, and the learning environment. One such innovation is interactive learning media. Unlike media that function primarily as information-delivery tools, interactive media allow students to respond, make choices, explore content, receive feedback, solve problems, and interact directly with learning materials (Novitasari & Wijaya, 2022; Nurhalimah & Fitria, 2020). These characteristics give interactive media the potential to create more participatory learning environments and support student engagement (Putri & Supriyanto, 2021).

This is consistent with the findings of (Chiu, 2021), who reported that digital support strategies delivered through a Learning Management System (LMS) can strengthen students' perceptions of support for autonomy, competence, and relatedness. The fulfillment of these psychological needs was associated with higher levels of behavioral, cognitive, and affective engagement.

Research by Syarif (2025) showed that the use of Quizizz significantly increased student engagement compared with conventional learning methods, particularly in terms of active participation and interest in learning materials. (Menhard, 2024) found that the integration of virtual reality (VR) provided a more immersive learning experience, which was associated with higher engagement and improved learning outcomes. Meanwhile, (Asgar et al., 2025) concluded that the use of TikTok in learning could increase student motivation because of its interactive and accessible characteristics.

In addition, (Anggrainy, 2024) reported that the use of Wordwall increased students' learning motivation, active participation, and understanding of learning materials, particularly in English-language instruction. Consistent with these findings, (Fakhri et al., 2023) showed that the implementation of the flipped classroom approach had a significant positive effect on students' knowledge, skills, and engagement.

In relation to learning outcomes, Samah et al. (2024) found that gamification could support improved academic achievement while also creating a more engaging learning experience.

Although interactive learning media have considerable potential to increase student engagement, their implementation still faces several challenges. Limited educators' digital competence, inadequate devices and internet access, and insufficient policy support may hinder the effective use of interactive media (Sari et al., 2022). Some educators continue to experience difficulties in designing and optimizing technology-based learning media, particularly in areas with limited access to professional development. These challenges are compounded by inadequate technological infrastructure, including laptops, projectors, and internet connectivity, which remain problematic in some schools, particularly in disadvantaged, frontier, and outermost regions (*daerah tertinggal, terdepan, dan terluar [3T]*). In addition, the absence of policies or curricula that explicitly support interactive-media integration can make it difficult for educators to align technology use with established learning outcomes (Rahmawati & Sutrisno, 2021). In higher education, infrastructure limitations may also

coincide with reduced direct interaction between students and lecturers and difficulties in managing learning time (Iqbal & Muarif, 2024).

Challenges may also arise from the characteristics of the media themselves. The use of platforms such as TikTok may create distractions through exposure to noneducational content and may make it more difficult for students to evaluate the validity of information (Asgar et al., 2025). This indicates that media selection should be aligned with learning objectives and user characteristics so that technology supports rather than disrupts student engagement.

The effectiveness of interactive media also depends on educators' readiness, infrastructure availability, and sustained institutional support and commitment (Akyuna et al., 2025). Therefore, successful implementation depends not only on the technology itself but also on educator competence, student readiness, the quality of learning interactions, and the broader institutional environment.

These findings indicate that the use of interactive media should not be evaluated solely in terms of its positive effects on learning. Implementation barriers must also be considered to develop a more comprehensive understanding of effectiveness. A useful analytical framework should therefore explain both how the benefits of interactive media can be sustained and how implementation constraints can be addressed.

Although previous studies have reported positive outcomes for specific technologies, the evidence remains dispersed across different media, educational contexts, engagement dimensions, and implementation conditions. A systematic literature review (SLR) is therefore appropriate for organizing these findings into a coherent synthesis of how interactive media contribute to student engagement, which media functions appear most useful for particular learning purposes, and which conditions constrain implementation. The novelty of this review lies in integrating these three analytical dimensions within a single synthesis rather than examining platform effectiveness, engagement outcomes, and implementation barriers as separate issues. The review focuses on TikTok, the flipped classroom, Quizizz, virtual reality (VR), artificial intelligence (AI), Canva, Wordwall, and other technology-based media represented in the reviewed literature, with the aim of clarifying their contributions to student engagement and the conditions under which those contributions are most likely to occur.

Research Question (RQ)

1. How do interactive learning media influence the level and quality of student engagement across educational settings?
2. What types of interactive learning media are reported as effective for increasing student engagement?
3. What challenges affect the implementation of interactive learning media for student engagement?

METHOD

Review Design and Questions

This study employed a systematic literature review (SLR) informed by the PRISMA approach to synthesize empirical evidence on interactive learning media and student engagement (Selcuk, 2019). The review was guided by three questions addressing the effects of interactive media on student engagement, the types of media reported as effective, and the implementation challenges influencing their use. Because the included studies varied in media type, educational

setting, research design, and reported outcomes, the findings were synthesized narratively rather than through a pooled statistical estimate.

Eligibility Criteria

Eligible records were full-text empirical journal articles published from 2021 to 2025, involved student samples, addressed interactive learning media and student engagement, and were published in journals identified in the manuscript as formally registered through Scopus, SINTA, or an E-ISSN. Quantitative, qualitative, and longitudinal designs were eligible when the title, abstract, and full text were relevant to at least one research question. Non-empirical reviews, publications before 2021, studies with ineligible samples, unregistered journals, and articles that did not address the review focus were excluded.

Table 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
Full-text empirical journal article	Non-empirical studies such as reviews
Published in 2021–2025	Published before 2021
Student sample	Sample does not meet the eligibility criteria
Journal formally registered through Scopus, SINTA, or E-ISSN	Journal not formally registered
Quantitative, qualitative, or longitudinal study	Study is irrelevant to the review theme
Title and abstract relevant to the review focus	Title or abstract is not relevant to the review focus
Article addresses at least one Research Question (RQ)	Article does not address the Research Questions

Source: Authors' review protocol, 2026.

Search Strategy and Study Selection

The manuscript records Google Scholar as the source used to identify candidate publications and lists topic terms including “interactive learning media,” “student engagement,” and “student involvement.” The documented selection flow starts with 32 candidate articles published between 2021 and 2025. After title and abstract screening, 12 articles were excluded because they did not meet the research focus or were not retained for full analysis, leaving 20 studies for synthesis. [DATA PENULIS DIPERLUKAN: confirm the exact Google Scholar search date and the final Boolean search string used for the review.]

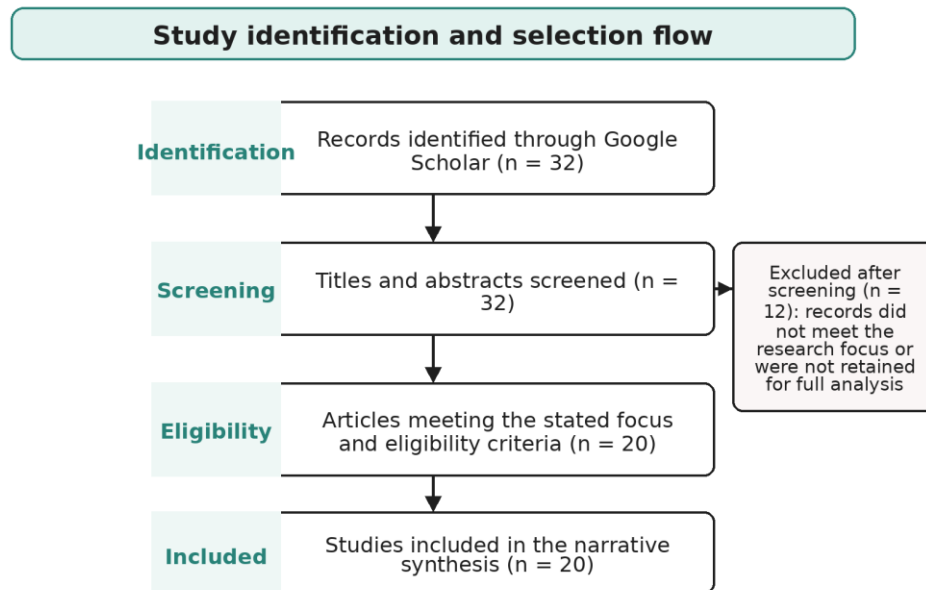


Figure 1. Study Identification and Selection Flow Based on PRISMA

Source: Authors' review process based on the PRISMA framework (Selcuk, 2019).

Data Extraction and Synthesis

For each included article, the review extracted the study identity, learning medium or strategy, educational context, engagement-related outcome, key finding, and implementation challenge when reported. Findings were organized according to the three research questions and compared across studies to identify recurring patterns in behavioral, cognitive, and emotional engagement, media-specific functions, and implementation constraints. The manuscript does not report a standardized methodological quality or risk-of-bias instrument; therefore, no formal quality score is introduced in this revision. [DATA PENULIS DIPERLUKAN: confirm whether a formal methodological quality or risk-of-bias appraisal was conducted and, if so, specify the instrument and decision criteria.]

RESULTS AND DISCUSSION

The 20 included articles were synthesized according to the three research questions. The study-level evidence is presented as a narrative comparison because the reviewed studies use different technologies, educational settings, designs, and outcome measures. The tables below therefore summarize the direction and practical meaning of the reported findings rather than implying a common effect size across studies.

Effects of Interactive Media on Student Engagement

Interactive media were reviewed in relation to participation, motivation, attention, understanding, and other engagement-related outcomes across the educational settings represented in the included studies.

Table 2. Evidence on Interactive Learning Media and Student Engagement

Study	Title	Journal	RQ1 Synthesis
(Priyakanth et al., 2021; Putra & Ningsih, 2023)	Augmented reality-based learning media to improve science learning outcomes in elementary schools	International Journal of Educational Research Review	AR media in learning has a higher level of understanding compared to students who use conventional media. This condition occurs because AR media is able to present material in a more concrete way and allows students to manipulate and explore learning objects, so that it can support the improvement of exploration and problem-solving skills.
Asgar, A., Idris, A. H., Octaviani, R., Habesia, H., & Rillan, Y. (2025).	Analysis of Student Experience in Using Tiktok as a Learning Medium.	Journal of Innovative Research and Learning,	Interactive learning media is able to minimize barriers to accessing information and present material in a format that suits the needs of students, such as visuals and concise presentations, can play an effective role in increasing extrinsic motivation
Thomas K.F. Chiu (2021)	Digital support for student engagement in blended learning based on self-determination theory	Computers in Human Behavior	The implementation of digital support strategies through LMS (Learning Management System) is able to strengthen students' perception of the support provided; then encourage higher student involvement,
Putri, M. A., & Supriyanto, A. (2021).	Digital native generation and 21st century learning challenges	Indonesian Journal of Basic Education	Interactive media has the potential to create a more participatory learning environment and support the involvement of these students (Putri & Supriyanto, 2021).
Sukron Makmun, Muh. Amar, Zainudin, Adim Isral Ayubi, and Nadila Risti Puji Lestari (2024)	Enhancing Student Engagement through Practical Production and Utilization of Instructional Materials in an Educational Technology Class: A Multifaceted Approach	NIU Journal of Educational Research	Increased engagement and understanding of interactive, multisensory learning materials can cater to diverse learning styles, encourage active interest, and facilitate deeper understanding

Source: Synthesized from the studies reviewed in this article, 2026.

Media Types and Contextual Effectiveness

The reviewed studies describe several media as effective for particular learning purposes, but the evidence does not support a universal ranking across technologies because the studies differ in context, outcome, and design.

Table 3. Reported Effectiveness of Interactive Learning Media

Study	Title	Journal	RQ Answer 2
(Qadri Syarif, 2025).	<i>Increase student engagement in learning through the Quizizz platform.</i>	Journal of Digital Education and Learning Technology	The use of the Quizizz platform significantly increases student engagement, with the greatest increases seen in active participation and interest in the material that drives engagement.

Study	Title	Journal	RQ Answer 2
Putra, R., & Ningsih, A. (2023)	<i>Augmented reality-based learning media to improve science learning outcomes in elementary schools</i>	International Journal of Educational Research Review	AR media in learning has a higher level of understanding compared to students who use conventional media. This condition occurs because AR media is able to present material in a more concrete way and allows students to manipulate and explore learning objects, so that it can support the improvement of exploration and problem-solving skills.
Anggrainy, S. (2024).	<i>The Use of Wordwall Media in Interactive Learning in Students of UIN Raden Intan Lampung</i>	Jurnal At-Tadris	The use of Wordwall media has been proven to increase learning motivation, students' activeness in the learning process, and their understanding of the material, especially in English learning.
Kavisha (Duggal et al., 2021), Lovy Raj Gupta, & Parminder Singh (2021)	<i>Gamification and Machine Learning Inspired Approach for Classroom Engagement and Learning</i>	Mathematical Problems in Engineering	Interactive gamification app uses an ANFIS (Adaptive Neuro-Fuzzy Inference System) model for intelligent decision-making regarding reward distribution. Provides insights into how students interact with gamification systems and demonstrates the success of this model in increasing student engagement
Agesh (Raju et al., 2021), Satyendra Bhat, Sriranga Bhat, Rio d'Souza, Athokpam Bikramjit Singh (2021)	<i>Effective Usage of Gamification Techniques to Boost Student Engagement</i>	Journal of Engineering Education Transformations	Gamification tools (Kahoot, Quizizz, and Mentimeter) are primarily a combination of audio and points, enhancing student interaction and creating positive classroom dynamics that encourage engagement in the learning process.
Priyankanth, R., Abburi, R., & Praveena, M. (2021).	<i>Design and Impact of Interactive Video Content for the Improvement of Student Engagement and Learning</i>	Journal of Engineering Education Transformations	The use of H5P-based interactive video on LMS shows increased student engagement and participation as well as their ability to analyze case studies and adapt to new programming languages.
Yoon, M., Zheng, H., & Jo, I.-H. (2022).	<i>Interactive Video Player for Supporting Learner Engagement in Video-Based Online Learning.</i>	Educational Technology International,	Students who use <i>Interactive Video Player</i> get better <i>achievements</i> than students who use <i>conventional video players</i> .
(Nita et al., 2025), S., Untari, E., Sussolaikah, K., & Rifai, M. H. (2025)	<i>Development of Canva-Based Digital Learning Media to Increase Student Engagement in Online Learning.</i>	Digitech Journal	The final results show that the Canva application is effective in increasing student engagement as a creative, innovative and collaborative digital learning medium so that it can help educators in delivering materials and make it easier for students to understand learning materials that are carried out online.

Study	Title	Journal	RQ Answer 2
Menhard, M. (2024).	<i>The Impact of Virtual Reality on Student Engagement and Learning Outcomes in Higher Education.</i>	Mandalika Light Journal	The findings of the study show that the use of Virtual Reality (VR) technology in learning has the potential to be one of the effective approaches in increasing student involvement while supporting the achievement of more optimal learning outcomes.
Fakhri, M. M., Andayani, D. D., Kaswar, A. B., Adistia, A. Z., & Fadhilatunisa, D. (2023).	<i>The Impact of the Implementation of Flipped Classroom on Knowledge, and Student Involvement in Learning.</i>	Judicative: Journal of Education and Research,	The results of the study show that the implementation of the <i>flipped classroom</i> model with the support of interactive videos has a significant influence on improving knowledge, skills, and student involvement in the learning process.

Source: Synthesized from the studies reviewed in this article, 2026.

Implementation Challenges

Implementation challenges were synthesized to identify the conditions that may limit engagement gains even when interactive media are pedagogically appropriate.

Table 4. Reported Challenges in Implementing Interactive Learning Media

Study	Title	Journal	RQ 3 Answer
Sari, M., Firmansyah, D., & Zulherman. (2022)	<i>Teachers' digital literacy in facing learning in the 4.0 era</i>	Journal of Basic Education of the archipelago)	Student involvement, the implementation of which still faces various challenges related to the competence of educators, the availability of infrastructure, educational policies, and the characteristics of the media used.
Rahmawati, I., & Sutrisno, S. (2021)	<i>Use of interactive apps to improve students' interest and learning outcomes</i>	Journal of Education and Technology	This study stated that the lack of policies and curriculum that specifically encourages the integration of interactive media also makes it difficult for teachers to adjust the use of technology to the learning outcomes that have been determined.
Iqbal, M., & Muarif, S. (2024)	<i>The Impact of IT-Based Learning Media on the Educational Experience of STAIN Meulaboh Students.</i>	WATHAN: Scientific Journal of Education and Culture	In the journal, it was stated that limited infrastructure can have an impact on reducing direct interaction between students and lecturers and causing difficulties in managing study time.
Asgar, A., Idris, A. H., Octaviani, R., Habesia, H., & Rillan, Y. (2025)	<i>Analysis of Student Experience in Using Tiktok as a Learning Medium.</i>	Journal of Innovative Research and Learning,	The results of the analysis provide information that the use of platforms such as TikTok has the potential to cause distractions due to exposure to non-educational content and make it difficult for students to

Study	Title	Journal	RQ 3 Answer
(Qurrota Akyuna et al., 2025)	<i>The Role of Interactive Learning Media in Increasing Student Participation.</i>	Journal of Civilization: Journal of Islamic Education,	ensure the validity of information The findings of the study indicate that the effectiveness of the implementation of interactive media is influenced by the readiness of educators, the availability of infrastructure, and the support and commitment of institutions in a sustainable manner

Source: Synthesized from the studies reviewed in this article, 2026.

Across the reviewed studies, interactive learning media were generally associated with stronger student engagement in behavioral, cognitive, and emotional forms. Interactivity gives students opportunities to respond, explore content, receive feedback, and participate more actively, which helps explain why the benefits extend beyond visible participation to attention and learning involvement.

Chiu's (2021) findings show that digital support through the Learning Management System can strengthen engagement through meeting the needs of autonomy, competence, and connectivity. This is in line with the research of Syarif (2025), Menhard (2024), and Fakhri et al. (2023) which showed increased participation and engagement through Quizizz, Virtual Reality, and Flipped Classroom. In line with these findings, (Makmun et al., 2025) phasized that interactive and multisensory learning media can increase student engagement and understanding through a more engaging learning experience and in accordance with a diversity of learning styles. Thus, Research Question (RQ) 1 was answered that interactive media contributes to improving the level and quality of student involvement by encouraging more active and participatory learning.

The findings also show that technology alone does not guarantee engagement. Media design, learner characteristics, pedagogical strategy, learning context, and the way educators integrate the technology can strengthen or weaken its contribution to engagement (Munna & Kalam, 2021). This means that the relevant question is not simply whether interactive media are used, but how well a specific medium is aligned with the learning task and the intended form of engagement.

For RQ2, the reviewed evidence does not identify one medium that is universally most effective. Quizizz and Wordwall tend to support participation and motivation, Virtual Reality provides an immersive learning experience, and Flipped Classroom structures engagement through a different organization of learning activities (Anggrainy, 2024; Fakhri et al., 2023; Menhard, 2024; Syarif, 2025). (Yoon et al., 2022) further reported better achievement with an Interactive Video Player than with a conventional video player. These differences indicate that effectiveness is better interpreted as pedagogical fit than as technological superiority.

For RQ3, implementation constraints cluster around educator competence, infrastructure, institutional support, and risks that are specific to particular platforms. Limited infrastructure and digital competence can reduce the quality of implementation (Sari et al., 2022; Akyuna et al., 2025), while higher-education contexts may also face reduced direct

interaction and difficulties in time management (Iqbal & Muarif, 2024). Platforms such as TikTok introduce additional risks of distraction and uncertain information validity (Asgar et al., 2025). Consequently, sustainable engagement gains require readiness at the educator, infrastructure, institutional, and media-design levels.

CONCLUSION

The review indicates that interactive learning media can strengthen student engagement by supporting active participation, motivation, attention, exploration, and more interactive learning experiences. However, the evidence does not identify any single medium as universally superior. Gamified tools such as Quizizz and Wordwall, interactive video, virtual reality (VR), the flipped classroom, and other technology-based approaches contribute through different mechanisms, and their effectiveness depends on alignment with learning objectives, student characteristics, learning materials, pedagogical design, and implementation context. The central implication is that interactive technology is most effective when it is deliberately integrated into the learning process rather than treated as a stand-alone solution.

The review is limited by the search information reported in the manuscript, the 2021–2025 publication period, heterogeneity across the included studies, and the absence of a standardized quality-appraisal instrument. Future reviews should report a fully reproducible search strategy, apply an explicit methodological quality or risk-of-bias assessment, and compare engagement outcomes across behavioral, cognitive, and emotional dimensions using clearer criteria for educational level and media type. These improvements would enable stronger comparisons of when, for whom, and under what conditions interactive media produce meaningful gains in student engagement.

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CONFLICT OF INTEREST

The author states that there is no conflict of interest in the preparation of this article.

AUTHOR CONTRIBUTIONS

All authors contributed to conceptualization, search and synthesis of literature, interpretation of results, manuscript preparation, and critical review of manuscripts. All authors have read and approved the final version of the manuscript.

GENERATIVE AI STATEMENT

The authors declare that Generative Artificial Intelligence (Generative AI) was used solely to assist with language refinement, grammatical correction, and improvement of manuscript readability. All scientific concepts, interpretations, literature synthesis, analyses, and conclusions were developed by the authors. All AI-assisted content was carefully reviewed, verified, and revised by the authors, who take full responsibility for the accuracy, integrity, and final content of the manuscript.

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