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The Role of Padlet in Formative Assessment and Science Learning Reflection: A Systematic Literature Review

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A B S T R A C T
This study analyses the role of Padlet in formative assessment and science learning reflection, addressing a gap where systematic studies remain scarce. A Systematic Literature Review (SLR) using the PRISMA 2020 protocol was conducted across five academic databases, covering publications from 2016 to 2026. A total of 247 articles were identified, of which 15 met the inclusion criteria and were analyzed using thematic synthesis. Padlet plays a significant role in formative assessment through five dimensions and in learning reflection through four dimensions. Supporting factors include ease of use, flexibility, and real-time collaboration, while inhibiting factors include limited digital infrastructure and internet dependency. These findings suggest that Padlet is an effective digital platform for science education.

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INTRODUCTION

The digital era has fundamentally transformed the educational landscape, including science learning. The emergence of various Web 2.0-based platforms has opened new opportunities for creating more interactive, collaborative, and meaningful learning experiences for students (Crompton & Burke, 2018). One platform that has gained increasing popularity among educators is Padlet, a collaborative digital board that enables users to create, share, and collaborate on multimedia content in real-time (Haris et al., 2017). The popularity of Padlet in education is largely attributed to its ease of use, flexibility across various learning contexts, and its ability to support dynamic interactions between teachers and students (Mehta et al., 2021; Wang et al., 2025).

Formative assessment plays a crucial role in science learning. It serves as a mechanism for continuously monitoring students' learning progress while providing constructive feedback to enhance the quality of learning (Black & Wiliam, 1998). Empirical evidence suggests that quality feedback can significantly influence students' learning outcomes, with an average effect size of 0.48 (Wisniewski et al., 2020). Effective formative assessment strategies encompass a range of approaches, from peer assessment and self-assessment to continuous monitoring of student understanding (Wiliam & Leahy, 2015). In the digital era, various technological platforms have transformed the implementation of formative assessment into a more dynamic, responsive, and data-driven process (Kocabatmaz & Saraçoğlu, 2025). Padlet emerges as one such platform, offering distinctive features to support digital formative assessment, including multimedia content sharing, real-time feedback, and facilitation of peer assessment among students (Jong & Tan, 2021).

Learning reflection is equally important in the educational process alongside formative assessment. Reflection enables both students and teachers to critically and constructively evaluate their learning experiences (Schon, 1983). Through reflective activities, students can identify strengths and weaknesses in their understanding while building meaningful connections between new and prior knowledge (Morris, 2020). In science learning specifically, reflection has been shown to help students develop a deeper understanding of scientific processes, sharpen critical thinking skills, and build more robust conceptual understanding (Israwaty et al., 2025). Reflection also provides significant benefits for science teachers in developing more effective and responsive teaching practices that address students' needs (Wahyuni & Fadly, 2025).

Various studies have demonstrated that Padlet can effectively function as a learning reflection tool for both students and teachers through its interactive features that support the documentation and sharing of digital learning experiences (Dianati et al., 2020). Research has revealed the potential of Padlet in science learning from multiple perspectives. Its use has been shown to enhance science concept understanding (Baidoo et al., 2022; Kartina, 2022), promote more effective collaboration and communication among students (Mehta et al., 2021; Rahmawati et al., 2024), improve scientific literacy (Arfiani et al., 2021), and facilitate creativity and deeper exploration of scientific concepts (Palumpun et al., 2024). These findings collectively indicate that Padlet holds significant

pedagogical potential in science learning, encompassing various aspects from content delivery to assessment and reflection. Furthermore, Padlet is considered relevant in supporting the development of 21st-century competencies that are increasingly demanded in modern science education (Grii & Care, 2015).

Nevertheless, systematic and comprehensive studies specifically examining the role of Padlet in formative assessment and reflection in science learning remain scarce. Haris et al. (2017) noted that most research on Padlet has focused on collaboration and student engagement in language learning, while formative assessment and reflection in science learning have received disproportionately less attention. This gap underscores the need for a systematic review capable of integrating and synthesizing findings from existing studies. A Systematic Literature Review (SLR) approach using the PRISMA 2020 protocol (Page et al., 2021) is considered the most appropriate approach to address this gap, given its capacity to systematically and transparently identify, evaluate, and synthesize empirical evidence.

Based on the aforementioned background, this study formulates three research questions: (1) What is the role of Padlet in supporting the implementation of formative assessment in science learning? (2) What is the role of Padlet in facilitating science learning reflection for students and teachers? and (3) What are the supporting and inhibiting factors of Padlet implementation in formative assessment and science learning reflection? The findings of this study are expected to provide significant contributions for those seeking to effectively integrate Padlet into formative assessment and science learning reflection.

LITERATURE REVIEW

Padlet as a Digital Platform in Education

Padlet is a Web 2.0-based collaborative digital board platform that enables users to create, share, and collaborate on various types of multimedia content in real-time within a flexible and easily accessible learning environment (Haris et al., 2017). As a Web 2.0-based platform, Padlet leverages internet technology to create an interactive and collaborative digital learning space where teachers and students can interact dynamically without the constraints of time and place (O'reilly, 2007).

The strengths of Padlet lie in its intuitive interface, its flexibility across various learning contexts, and its ability to support multiple learning modalities simultaneously (Mehta et al., 2021). Numerous studies have demonstrated that Padlet is effectively used across various educational contexts, ranging from language learning (Jong & Tan, 2021) and science learning (Baidoo et al., 2022; Kartina, 2022) to teacher professional development (Wahyuni & Fadly, 2025). Padlet's ability to integrate various types of multimedia content, including text, images, videos, and links, makes it a highly adaptive and responsive platform that caters to diverse learning needs in the digital era.

Formative Assessment in Science Learning

Formative assessment is defined as the process of collecting and interpreting evidence of students' learning progress, which is used by teachers and students to make decisions about subsequent learning steps (Black & Wiliam, 1998). Unlike summative assessment, which focuses on evaluating learning outcomes at the end of a learning period, formative assessment is continuous and integrated into daily learning processes (Wiliam & Leahy, 2015). In the context of science learning, formative assessment plays a highly strategic role, as the complexity and abstraction of scientific concepts often pose significant challenges for students (Kocabatmaz & Saraçoğlu, 2025).

Effective formative assessment encompasses a range of strategies, from peer assessment and self-assessment to project-based assessment, enabling students to authentically demonstrate their understanding (Panadero et al., 2018). Wisniewski et al. (2020) in their meta-analysis found that effective feedback has a significant influence on students' academic achievement, with an average effect size of 0.48, underscoring the importance of feedback quality in digital formative assessment.

Learning Reflection in the Context of Science Education

Learning reflection is a cognitive and metacognitive process that enables individuals to critically evaluate their learning experiences, identify strengths and weaknesses in their understanding, and formulate strategies to improve the quality of future learning (Schon, 1983). In the context of science learning, reflection plays a highly strategic role as it enables students to identify misconceptions, build meaningful connections between scientific concepts, and develop deeper and more integrated understanding (Morris, 2020).

Reflection also plays an important role for science teachers in developing more effective and responsive teaching practices that address students' needs (Suphasri, 2021). Schon (1983) distinguished two types of reflection in professional practice, namely reflection-in-action, which occurs during the learning process, and reflection-on-action, which occurs after the learning process is completed. (Meher et al., 2021) found that the use of metacognitive strategies, including reflection, significantly contributes to the improvement of students' academic achievement across various educational levels.

Integration of Digital Technology in Formative Assessment and Science Learning Reflection

The integration of digital technology in formative assessment and science learning reflection has become an increasingly growing trend over the past decade (Crompton & Burke, 2018). Various digital platforms now enable the implementation of more dynamic, responsive, and data-driven formative assessment, allowing teachers to collect real-time evidence of student understanding and provide timely feedback (Raja & Shirley, 2022). Mayer (2020) multimedia learning theory provides a strong theoretical foundation for the use of multimodal digital platforms such as Padlet, where learning that integrates multiple representational modalities tends to be more effective in supporting deep conceptual understanding.

Vygotsky (1980) social constructivism theory also provides a strong foundation for the use of collaborative digital platforms in formative assessment and reflection, given that effective learning occurs through meaningful social interaction within the Zone of Proximal Development (Broadbent & Poon, 2015). Furthermore, Granić (2022) found that perceived ease of use and perceived usefulness are the two primary factors determining the acceptance and adoption of technology in educational contexts, which has important implications for the successful implementation of Padlet in science learning.

METHODOLOGY

This study adopted a Systematic Literature Review (SLR) approach referring to the PRISMA 2020 protocol developed by (Page et al., 2021). The selection of the SLR approach was based on its capacity to systematically, comprehensively, and scientifically identify, evaluate, and synthesize empirical evidence from various relevant studies. This systematic review was built upon three research questions that guided the entire analytical process: (1) What is the role of Padlet in supporting the implementation of formative assessment in science learning?, (2) What is the role of Padlet in facilitating science learning reflection for students and teachers?, and (3) What are the supporting and inhibiting factors influencing the implementation of Padlet in formative assessment and science learning reflection?.

A systematic literature search was conducted covering the period from 2016 to 2026 across five relevant academic databases, namely Scopus, Google Scholar, ERIC, IEEE Xplore, and Sinta. To obtain comprehensive and relevant search results, the search was performed using predetermined keyword combinations, including: "Padlet" AND "formative assessment", "Padlet" AND "science education", "Padlet" AND "reflection" AND "learning", "Padlet" AND "collaborative learning" AND "science", and "Padlet" AND "pembelajaran sains". These keyword combinations were designed to ensure that all articles relevant to the research topic could be comprehensively identified.

The article selection process was conducted rigorously based on predetermined inclusion and exclusion criteria established prior to the search process. These criteria were established to ensure that only genuinely relevant and high-quality articles were included in the analysis. The inclusion criteria were as follows: 1) the article discusses Padlet as a primary or supporting tool in learning; 2) the article relates to formative assessment, feedback, or peer assessment; 3) the article relates to learning reflection or teaching practice reflection; 4) the article relates to science learning; 5) the article was published within the period of 2016–2026; 6) the article was written in English or Indonesian; and 7) the article is available in full-text version. The exclusion criteria were as follows: 1) the article does not specifically discuss Padlet; 2) the article focuses on non-science learning; 3) the article was published outside the period of 2016–2026; 4) the article is not available in full-text version; 5) the article is an editorial or opinion piece without empirical data; and 6) the article is a duplicate from different databases.

The article selection process was carried out through four stages following the PRISMA 2020 flow. In the identification stage, a total of 247 articles were retrieved from five databases, comprising Scopus (68 articles), Google Scholar (112 articles), ERIC (34 articles), IEEE Xplore (18 articles), and Sinta (15 articles). In the screening stage, 89 duplicate articles were eliminated, leaving 158 articles that were subsequently screened based on their titles and abstracts. From this screening process, 123 articles were excluded for failing to meet the predetermined criteria, resulting in 35 articles proceeding to full-text reading. In the eligibility stage, 20 articles were excluded, comprising those that did not specifically discuss Padlet (n=8), focused on non-science learning (n=7), were unavailable in full-text version (n=3), and were editorial pieces without empirical data (n=2). Ultimately, 15 articles met all inclusion criteria and were used as the primary data sources in this study. The article selection process through four stages in accordance with the PRISMA 2020 protocol is presented in Figure 1.

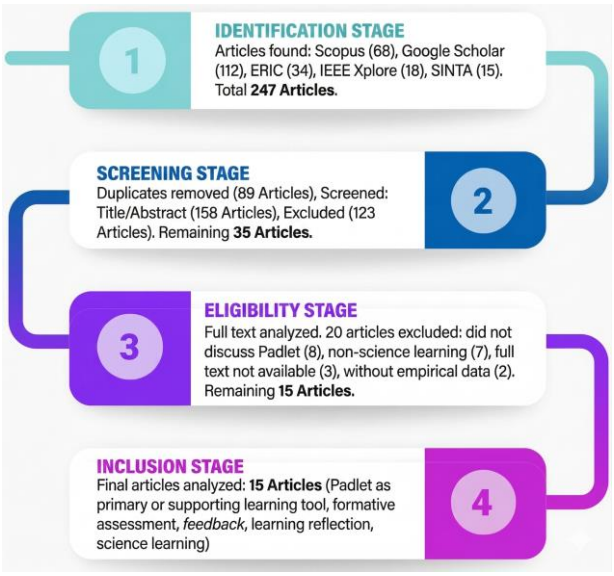

Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process

Data extraction was conducted systematically across all 15 included articles. The extracted data encompassed article identity, research characteristics, science learning context, identified roles of Padlet, formative assessment focus, learning reflection focus, key findings, and research limitations. The extraction process was carried out independently by two researchers to minimize subjective bias, and any discrepancies in the extraction results were resolved through discussion until a consensus was reached.

RESEARCH RESULT

The findings of the 15 analysed articles are presented systematically based on the three formulated research questions. These encompass the general characteristics of the reviewed articles, the role of Padlet in formative assessments within science education, its role in science learning reflection, and the supporting and inhibiting factors of its implementation.

Characteristics of the Analysed Articles

The fifteen analysed articles were published between 2020 and 2026, with the highest distribution in 2025 (n=5; 33.3%), followed by 2022 (n=3; 20%), 2021 and 2024 (n=2; 13.3% each), 2026 (n=2; 13.3%), and 2020 (n=1; 6.7%). The articles originated from six countries, with Indonesia being the largest contributor (n=7; 46.7%), followed by Ghana, Australia, and India (n=2; 13.3% each), as well as Turkey and the United Kingdom (n=1; 6.7% each). In terms of methodology, quantitative methods were the most predominantly used (n=5; 33.3%), followed by qualitative and mixed methods (n=3; 20% each), alongside Research and Development (R&D) and case studies (n=2; 13.3% each). Regarding the educational level, higher education was the most frequently investigated (n=6; 40%), followed by senior high school (n=5; 33.3%), elementary school (n=2; 13.3%), as well as teacher professional education and junior high school (n=1; 6.7% each). A total of 53.3% of the articles were indexed in Scopus, 20% in Sinta, and 20% in ERIC. The complete characteristics of the 15 analysed articles are presented in Table 1.

Table 1. General Characteristics of the 15 Analysed Articles

No.	Author(s)	Country	Method	Educational Level	Science Context	Indexing
1	Wang et al. (2025)	Australia	Case Study	Higher Education	Multidisciplinary	Scopus Q1
2	Anugraha et al. (2025)	Indonesia	R&D (ADDIE)	Elementary School	Elementary Science	Sinta 2
3	Dianati et al. (2020)	Australia	Qualitative	Higher Education	Multidisciplinary	Scopus Q1
4	Mehta et al. (2021)	United Kingdom	Mixed Methods	Higher Education	Biology, Pharmacy	Scopus Q2
5	Kocabatmaz & Saraçoğlu (2025)	Turkey	Qualitative	Higher Education	General	ERIC
6	Agavekar et al. (2026)	India	Quantitative	Higher Education	Applied Science	Scopus Q2
7	Wahyuni & Fadly (2025)	Indonesia	Mixed Methods	Teacher Professional Education	Natural Science	Sinta 2
8	Baidoo et al. (2022)	Ghana	Quantitative	Senior High School	Biology/Ecology	Scopus Q3
9	Boateng & Nyamekye (2022)	Ghana	Quantitative	Senior High School	Integrated Science	Scopus Q3
10	Rath (2025)	India	Case Study	Higher Education	Health Education	Scopus Q1
11	Israwaty et al. (2025)	Indonesia	R&D (ADDIE)	Elementary School	Elementary Science	IEEE
12	Palumpun et al. (2024)	Indonesia	Qualitative	Senior High School	Biology	Scopus

No.	Author(s)	Country	Method	Educational Level	Science Context	Indexing
13	Kartina (2022)	Indonesia	Quantitative	Senior High School	Biology	Sinta 3
14	Arfiani et al. (2021)	Indonesia	Mixed Methods	Junior High School	Natural Science	Sinta 3
15	Rahmawati et al. (2024)	Indonesia	Quantitative	Senior High School	Biology	Sinta 2

Analysis of Research Focus, Key Findings, and Limitations

The analysis of the research focus and the role of Padlet within the 15 analysed articles is comprehensively presented in Table 2. Furthermore, the analysis of the key findings and limitations of the 15 analysed articles is comprehensively presented in Table 3.

Table 2. Analysis of Research Focus and the Role of Padlet

No.	Author(s)	Article Title	Research Focus
1	Wang et al. (2025)	Padlet Adoption to Enhance Multidisciplinary Online and Hybrid Teaching and Learning at an Australian University	Adoption of Padlet in multidisciplinary online and hybrid teaching and learning
2	Anugraha et al. (2026)	Development of a Padlet-Based Interactive Digital Comic to Enhance Learning Outcomes and Appeal of Science for Elementary School Students	Development of a Padlet-based interactive digital comic for elementary science
3	Dianati et al. (2020)	Student perceptions of technological tools for flipped instruction: The case of Padlet, Kahoot! and Cirrus	University students' perceptions of Padlet in flipped instruction
4	Mehta et al. (2021)	Content-specific differences in Padlet perception for collaborative learning amongst undergraduate students	Content-specific differences in Padlet perception within collaborative learning
5	Kocabatmaz & Saraçoğlu (2025)	Web 2.0-Based Peer Assessment: Padlet as a Digital Feedback Environment	Padlet as a digital feedback environment in peer assessment
6	Agavekar et al. (2026)	Effectiveness of Padlet as an ICT tool to enhance students' engagement with concept learning in the post pandemic era	Effectiveness of Padlet in enhancing engineering students' engagement
7	Wahyuni & Fadly (2025)	The Use of Padlet Application as a Reflection Tool for Science Teachers' Teaching Practice: A Mixed Methods Study	The use of Padlet as a reflection tool for science teachers' teaching practice
8	Baidoo et al. (2022)	Assessing the Effectiveness of Padlet Instructional Tool in the Teaching and Learning of some Ecological Concepts	Effectiveness of Padlet in teaching ecological concepts in senior high school

No.	Author(s)	Article Title	Research Focus
9	Boateng & Nyamekye (2022)	Learning Sciences with Technology: The Use of Padlet Pedagogical Tool to Improve High School Learners' Attainment in Integrated Sciences	The use of Padlet to improve students' attainment in integrated science
10	Rath (2025)	Padlet: a tool for fostering collaborative learning and feedback literacy in dental education	Padlet to foster collaborative learning and feedback literacy
11	Israwaty et al. (2025)	Padlet Platform-Based Science Electronic Worksheet Applies Constructivist Learning Principles for Elementary Schools	Development of a Padlet-based electronic student worksheet for elementary science
12	Palumpun et al. (2024)	Analysis of student creativity on transfer and transformation energy in the photosynthesis process using Padlet-assisted learning videos	Analysis of students' creativity on the topic of photosynthesis using Padlet
13	Kartina (2022)	Improving Understanding of Human Reproductive System Materials Using Padlet Application: Utilization of Digital Literacy in Science Learning	Improving understanding of the reproductive system using Padlet
14	Arfiani et al. (2021)	The Implementation of The Pjbl Method Assisted by Padlet on Environmental Pollution Material on Student Science Literature	Implementation of Padlet-assisted PjBL on environmental pollution material
15	Rahmawati et al. (2024)	The Using of Padlet on Students' Communication and Collaboration Skill in Immune System Material	The use of Padlet on students' communication and collaboration skills

Table 3. Analysis of Key Findings and Limitations

No.	Author(s)	Key Findings	Limitations
1	Wang et al. (2025)	Padlet enhances student engagement and collaboration in online and hybrid learning.	Limited to a single university; does not measure long-term impacts.
2	Anugraha et al. (2026)	Padlet-based digital comics are highly feasible (92.3% validity) and highly practical (89.7% practicality).	Limited to one school; constraints in elementary students' access to digital devices.
3	Dianati et al. (2020)	Padlet is perceived positively as a tool for collaboration and reflection in flipped instruction.	Relies on subjective perceptions; does not measure direct impact on learning outcomes.

No.	Author(s)	Key Findings	Limitations
4	Mehta et al. (2021)	Science students demonstrate more positive perceptions of Padlet for collaborative learning.	Limited to two study programs; small sample size.
5	Kocabatmaz & Saraçoğlu (2025)	Padlet is effective as a digital peer assessment platform that improves the quality of feedback.	Limited to one institution; short research duration.
6	Agavekar et al. (2026)	Padlet significantly increases student engagement ($p < 0.05$) in concept learning.	Limited to one engineering study program; small sample size.
7	Wahyuni & Fadly (2025)	Padlet effectively facilitates deep reflection and encourages science teachers' professional development.	Limited to a specific group of science teachers; long-term impacts have not been investigated.
8	Baidoo et al. (2022)	Padlet significantly improves the understanding of ecological concepts (gain score of 0.68).	Limited to specific ecological concepts; conducted in a single school in Ghana.
9	Boateng & Nyamekye (2022)	Padlet significantly improves students' academic attainment ($p < 0.05$).	Limited to one school; does not consider socioeconomic factors.
10	Rath (2025)	Padlet effectively fosters collaborative learning and enhances students' feedback literacy.	Limited to a single dental study program; small sample size.
11	Israwaty et al. (2025)	Padlet-based student worksheets are highly feasible (91.5% validity) and highly practical (88.3% practicality).	Limited to the development stage; effectiveness has not been tested on a wider scale.
12	Palumpun et al. (2024)	Padlet supports the development of students' creativity and metacognitive reflection in biology.	Limited to one biology topic; does not measure creativity quantitatively.
13	Kartina (2022)	Padlet significantly improves student understanding (N-gain of 0.72).	Limited to one school and one biology subject matter.
14	Arfiani et al. (2021)	Padlet-assisted PjBL significantly improves junior high school students' science literacy.	Limited to one school; does not compare PjBL effectiveness with and without Padlet.
15	Rahmawati et al. (2024)	Padlet significantly improves students' communication and collaboration skills ($p < 0.05$).	Limited to one school and one biology topic; long-term impacts are not examined.

Mapping the Role of Padlet in Formative Assessment and Science Learning Reflection

Based on the analysis of the 15 articles, five primary roles of Padlet in formative assessment and four primary roles in science learning reflection were identified. The comprehensive mapping of Padlet's roles is presented in Table 4.

Table 4. Mapping the Role of Padlet in Formative Assessment and Science Learning Reflection

No.	Dimension	The Role of Padlet	Supporting Articles	Key Findings
1	Formative Assessment	Digital peer assessment platform	Kocabatmaz & Saraçoğlu (2025); Rath (2025)	Improves the quality of feedback and encourages critical reflection in the assessment process.
		Monitoring tool for the understanding of science concepts	Baidoo et al. (2022); Boateng & Nyamekye (2022); Kartina (2022)	Gain score of 0.68 (ecology); N-gain of 0.72 (reproductive system); significant improvement ($p < 0.05$) in integrated science.
		Project-based assessment medium	Arfiani et al. (2021)	Significantly improves junior high school students' science literacy through Padlet-assisted PjBL.
		21st-century skills assessment platform	Rahmawati et al. (2024); Agavekar et al. (2026); Mehta et al. (2021)	Improves communication and collaboration skills ($p < 0.05$); increases student engagement ($p < 0.05$).
		Assessment medium through interactive content	Anugraha et al. (2026); Israwaty et al. (2025)	92.3% validity and 89.7% practicality (digital comic); 91.5% validity and 88.3% practicality (student worksheets).
2	Learning Reflection	Reflection tool for science teachers' teaching practices	Wahyuni & Fadly (2025)	Facilitates deep reflection and encourages the professional development of science teachers.
		Reflection platform for students' learning experiences	Dianati et al. (2020); Israwaty et al. (2025)	Students' positive perceptions of Padlet as a reflection tool in flipped instruction.

No.	Dimension	The Role of Padlet	Supporting Articles	Key Findings
		Metacognitive reflection medium	Israwaty et al. (2025); Palumpun et al. (2024)	Facilitates students' reflection and metacognition in science learning.
		Collaborative reflection platform	Rath (2025); Kocabatmaz & Saraçoğlu (2025); Wang et al. (2025)	Facilitates effective collaborative reflection across various science learning contexts.

Supporting and Inhibiting Factors of Padlet Implementation

The analysis identified five supporting factors and four inhibiting factors regarding the implementation of Padlet in formative assessment and science learning reflection, as presented in Table 5.

Table 5. Supporting and Inhibiting Factors of Padlet Implementation in Science Learning

No.	Category	Factor	Description	Supporting Articles	Frequency
1	Supporting	Ease of use and intuitive interface	Padlet features a user-friendly interface, making it easily adopted by teachers and students without requiring intensive technical training.	Wang et al. (2025); Dianati et al. (2020); Agavekar et al. (2026)	3 artikel (20%)
		Flexibility and cross-device accessibility	Padlet can be accessed via various digital devices anytime and anywhere, thereby supporting mobile and flexible learning.	Wang et al. (2025); Israwaty et al. (2025); Baidoo et al. (2022)	3 artikel (20%)
		Real-time collaboration capability	Padlet allows students and teachers to collaborate, share content, and provide feedback directly and simultaneously.	Mehta et al. (2021); Rahmawati et al. (2024); Rath (2025)	3 artikel (20%)
		Diverse multimedia support	Padlet supports various types of multimedia content, including text, images, videos, and interactive quizzes, which support the	Anugraha et al. (2026); Palumpun et al. (2024); Israwaty et al. (2025)	3 artikel (20%)

No.	Category	Factor	Description	Supporting Articles	Frequency
			multimodal representation of science concepts.		
		Encouraging active student participation	Padlet encourages students' engagement and active participation in science learning through various engaging and meaningful interactive activities.	Boateng & Nyamekye (2022); Arfiani et al. (2021); Kartina (2022)	3 artikel (20%)
2	Inhibiting	Digital infrastructure limitations	Limited access to the internet and adequate digital devices poses a significant barrier to Padlet implementation, particularly in remote areas and under-resourced schools.	Baidoo et al. (2022); Anugraha et al. (2026); Israwaty et al. (2025)	3 artikel (20%)
		Limitations of the free version features	The restricted number of boards that can be created and the limited storage capacity in the free version of Padlet hinder optimal implementation in intensive science learning contexts.	Wang et al. (2025); Agavekar et al. (2026)	2 artikel (13.3%)
		The need for initial teacher and student training	Several teachers and students require preliminary training before they can effectively use Padlet within the context of science learning.	Wahyuni & Fadly (2025); Boateng & Nyamekye (2022); Kartina (2022)	3 artikel (20%)
		Reliance on a stable internet connection	As a cloud-based platform, Padlet requires a stable internet connection	Agavekar et al. (2026); Baidoo et al. (2022);	3 artikel (20%)

No.	Category	Factor	Description	Supporting Articles	Frequency
			to function optimally; thus, connection instability can disrupt the learning process.	Boateng & Nyamekye (2022)	

Summary of Findings Based on Research Questions

The summary of findings based on the three formulated research questions is presented in Table 6.

Table 6. Summary of Findings Based on Research Questions

No.	Research Question	Key Findings	Supporting Articles	Number of Articles
1	RQ1: The role of Padlet in formative assessment within science learning	Padlet serves as: (1) a digital peer assessment platform; (2) a monitoring tool for concept understanding; (3) a project-based assessment medium; (4) a 21st-century skills assessment platform; (5) an interactive content assessment medium.	Kocabatmaz & Saraçoğlu (2025); Rath (2025); Baidoo et al. (2022); Boateng & Nyamekye (2022); Kartina (2022); Arfiani et al. (2021); Rahmawati et al. (2024); Agavekar et al. (2026); Anugraha et al. (2026); Israwaty et al. (2025)	10
2	RQ2: The role of Padlet in science learning reflection	Padlet serves as: (1) a reflection tool for teachers' teaching practices; (2) a reflection platform for students' learning experiences; (3) a metacognitive reflection medium; (4) a collaborative reflection platform.	Wahyuni & Fadly (2025); Dianati et al. (2020); Israwaty et al. (2025); Palumpun et al. (2024); Rath (2025); Kocabatmaz & Saraçoğlu (2025); Wang et al. (2025)	7
3	RQ3: Supporting and inhibiting factors of Padlet implementation	Supporting factors: ease of use, flexibility, real-time collaboration, multimedia support, and active participation. Inhibiting factors: infrastructure limitations, restrictions of free version features, training requirements, and internet connection reliance.	Wang et al. (2025); Dianati et al. (2020); Agavekar et al. (2026); Mehta et al. (2021); Baidoo et al. (2022); Boateng & Nyamekye (2022); Wahyuni & Fadly (2025); Kartina (2022)	8

DISCUSSION

The discussion is organized based on the three formulated research questions, supplemented by comparisons with previous studies and the limitations of this research.

The Role of Padlet in Formative Assessment within Science Learning

The findings of this study reveal that Padlet plays a significant and diverse role in supporting formative assessment practices across various science learning contexts. This aligns with the notion of Black & Wiliam (1998), who assert that high-quality formative assessment requires mechanisms that enable teachers to continuously monitor students' learning progress while providing targeted feedback.

Among the various identified roles, Padlet's function as a digital peer assessment platform emerges as the most prominent finding. Kocabatmaz & Saraçoğlu, (2025), alongside Rath (2025), consistently demonstrate that Padlet successfully creates a digital assessment ecosystem that encourages students to actively engage in the learning evaluation process. These findings are further reinforced by the meta-analysis results of Wisniewski et al. (2020), which prove that high-quality feedback provides a tangible impact on student learning outcomes, with an average effect size of 0.48. This figure indicates that Padlet, as a medium facilitating prompt and constructive feedback, has the potential to make a meaningful contribution to the improvement of students' science learning achievements.

The consistency of findings regarding Padlet's capability to monitor the understanding of science concepts also warrants special attention. Baidoo et al. (2022) reported a gain score of 0.68, Kartina (2022) noted an N-gain of 0.72, while Boateng & Nyamekye (2022) reported a statistically significant improvement ($p < 0.05$). The alignment of these findings across different science contexts and educational levels strengthens the conviction that Padlet is a reliable instrument for monitoring the development of students' understanding of science concepts. This perspective aligns with Wiliam & Leahy (2015), who emphasize that the continuous monitoring of student understanding is a central pillar in the effective implementation of formative assessment.

In the realm of 21st-century skills assessment, Agavekar et al. (2026) and Rahmawati et al. (2024) consistently reported a significant increase in students' communication skills, collaboration, and engagement in science learning. These findings assert that Padlet is not only effective in assessing concept understanding but is also capable of serving as a medium for developing 21st-century competencies, which are increasingly required in contemporary science education (Grii & Care, 2015). Furthermore, the success of Anugraha et al. (2025) and Israwaty et al. (2025) in developing Padlet-based interactive learning media with exceptionally high levels of validity and practicality further strengthens Padlet's position as an innovative and high-quality assessment media development platform.

The Role of Padlet in Science Learning Reflection

This study also reveals that Padlet makes an equally important contribution in facilitating science learning reflection for both students and teachers. This finding resonates with the view of Schon (1983), who positions reflection as a crucial element in the development of professional practice, including within the realm of education.

The role of Padlet as a reflection instrument for science teachers' teaching practices is the most prominent finding within this dimension. Wahyuni & Fadly (2025) demonstrated that Padlet is effectively capable of encouraging science teachers to conduct deeper reflections on their teaching practices while simultaneously stimulating continuous professional development. This finding holds highly strategic implications for efforts to improve the quality of science teachers, considering that reflection is an inseparable component of the continuous teacher professional development cycle (Suphasri, 2021).

In the context of reflecting on students' learning experiences, Dianati et al. (2020) and Israwaty et al. (2025) consistently found that Padlet successfully created a conducive digital space for students to reflect on their learning experiences across various educational levels. This finding aligns with the experiential learning theory, which positions reflection as a central component in the experience-based learning cycle Morris (2020). Meanwhile, in the dimension of metacognitive reflection, Israwaty et al. (2025) and Palumpun et al. (2024) found that Padlet is capable of fostering students' metacognitive awareness in science learning. This achievement is in line with the findings of Meher et al. (2021), who proved that the use of metacognitive strategies contributes significantly to the improvement of students' academic achievements.

Regarding the collaborative reflection dimension, Kocabatmaz & Saraçoğlu (2025), Rath (2025) and Wang et al. (2025) simultaneously found that Padlet is able to foster a digital learning community that encourages productive and constructive collaborative reflection in science learning. This finding corresponds with (Vygotsky, 1980) social constructivism theory, which positions social interaction as the primary foundation in the knowledge construction process.

Supporting and Inhibiting Factors of Padlet Implementation

The analysis of factors influencing the implementation of Padlet yields several noteworthy findings. Ease of use and an intuitive interface emerge as the most consistently reported supporting factors across various studies (Agavekar et al., 2026; Dianati et al., 2020; Wang et al., 2025). This finding corresponds with the technology acceptance theory, which asserts that perceived ease of use is one of the primary determinants in technology adoption within educational environments (Granić, 2022). Furthermore, real-time collaboration capabilities and rich multimedia support are also proven to be significant supporting factors, aligning with Mayer (2020) multimedia learning theory, which emphasizes that the integration of various representation modalities tends to produce a deeper and more meaningful understanding of concepts.

On the other hand, digital infrastructure limitations emerge as the most dominant inhibiting factor, particularly in studies conducted in developing countries (Anugraha et al., 2025; Baidoo et al., 2022; Israwaty et al., 2025). This

finding corresponds with Dijk (2020) analysis, which asserts that the digital divide remains an unresolved challenge in the implementation of educational technology in developing countries. Additionally, the need for initial training for teachers and students is an inhibiting factor that cannot be ignored, considering that teachers' technological competence is a determining factor for successful technology integration in learning (Crompton & Burke, 2018).

In general, the findings of this study reinforce and expand upon the results of previous studies regarding the use of Padlet in educational contexts. Haris et al. (2017), in their review of teachers' perceptions of Padlet in language learning, found that ease of use and collaboration capabilities are the main appeals of this platform. This finding aligns with the results of this study, which position both factors as the primary supports for Padlet implementation in science learning. Meanwhile, in contrast to Jong & Tan (2021), who limited their study to the use of Padlet for assessing writing skills in language learning, this study successfully proves that Padlet is also highly effective in the context of formative assessment and science learning reflection, which possess different characteristics and demands. This finding broadens the horizon of understanding regarding Padlet's potential as an assessment and reflection platform that transcends the boundaries of language learning, proving to be relevant and effective in the context of science learning that demands multimodal concept representations and intensive collaboration (Rofiah et al., 2023).

This study is not without several limitations that must be acknowledged openly. First, the language scope, which is limited to English and Indonesian, potentially leads to the omission of relevant articles written in other languages. Second, although the literature search was conducted systematically across five academic databases, it is possible that relevant articles were still missed during the identification process. Third, the high heterogeneity of methodologies and research contexts among the analyzed articles limits the ability of this study to produce precise quantitative estimates regarding the effectiveness of Padlet in formative assessment and science learning reflection.

CONCLUSIONS AND RECOMMENDATIONS

This systematic review of 15 articles using the PRISMA 2020 protocol concludes that Padlet significantly enhances science formative assessment and learning reflection. While its implementation benefits from real-time collaboration and multimedia integration, it faces infrastructural and internet constraints. Therefore, science teachers should progressively integrate Padlet with institutional support. Future research must prioritize long-term studies in chemistry and physics education, alongside policy efforts to incorporate Padlet into national science curriculum.

ADVANCED RESEARCH

This study's limitations provide a foundation for future research. The restricted language scope may have excluded relevant articles. Furthermore, since most analysed studies are short-term and confined to single institutions,

broader long-term research is essential. Upcoming investigations should prioritize experimental designs with strict control groups and specifically explore Padlet in chemistry and physics education.

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