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EXPLORATION OF INTERACTIVE LITERACY IN DEVELOPING STUDENTS' CRITICAL READING SKILLS: A SYSTEMATIC LITERATURE REVIEW (SLR) REVIEW

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ABSTRACT
This systematic literature review aims to explore the contribution of interactive literacy in the development of students' critical reading skills at various levels of education. The analysis was conducted on 110 international articles published in 2020–2024, which were collected through reputable databases with strict inclusion criteria. The results show that interactive literacy strategies, including project-based learning, collaborative discussion, the use of multimodal texts, and individual reflection, are consistently effective in improving the ability to evaluate information, recognize biases, and build in-depth interpretations of texts. The success of the implementation of this strategy is influenced by the readiness of supporting infrastructure, teachers' pedagogical competence, and students' basic literacy levels. The distribution of publications also shows the dominance of contributions by countries with strong digital literacy policies, such as the United States, the United Kingdom, and Australia, while developing countries are beginning to show increased attention to interactive literacy. The findings of this study support literacy as a dynamic social practice that is relevant to the challenges of the 21st century, and recommend strengthening teacher training, developing contextual learning models, and literacy policies oriented towards equitable access to technology.

Keywords: interactive literacy, critical reading, systematic literature review

INTRODUCTION
In the 21st century, literacy has become one of the main pillars in education which is not only interpreted as the ability to read and write mechanically, but also as a high-level thinking competency that supports students' readiness to face global challenges (OECD, 2018). The change in the learning paradigm demands that the teaching and learning process place more emphasis on the development of critical, creative, collaborative, and communicative thinking skills, or what are often called higher-order thinking skills (Trilling & Fadel, 2009). In this context, literacy is no longer seen as just the activity of recognizing letters or understanding texts on the surface, but rather includes the ability to evaluate information, analyze arguments, and generate deep understanding (Voogt & Roblin, 2010) This demand places critical reading skills as an essential competency that needs to be instilled from an early age, so that students are able to be reflective, selective, and wise in dealing with increasingly complex and diverse information flows (Facione, 2011a).

Interactive literacy is a form of modern literacy that not only relies on the skill of understanding texts in a linear manner, but also combines the ability to use technology,

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interact with multimodal content, and collaborate with other users in the process of constructing meaning (Leu et al., 2015). According to Leu, Forzani, and Rhoads, interactive literacy involves reading and writing activities in a dynamic digital environment, where text, images, sounds, and interactive elements intertwine (Leu et al., 2015a). This distinguishes it from traditional literacy which focuses more on understanding printed texts individually without the involvement of technology and intense social interaction (Coiro & Hobbs, 2017) In the context of learning, interactive literacy plays an important role in facilitating an active and participatory learning process (Kress, 2010). Students not only become recipients of information, but also engage in collaborative searching, assessment, and production of digital content. This process can increase learning motivation, critical thinking skills, and readiness to face literacy challenges in the all-connected digital era (Rowsell & Walsh, 2011).

Critical reading skills refer to the ability to understand, analyze, evaluate, and reflect on the content of reading in depth using rational considerations and constructive skepticism (Ennis, 2011) In the context of the 21st century, critical reading is becoming increasingly important because students are faced with a flood of digital information that varies in quality and validity (Mason et al., 2014) Without critical reading skills, students are vulnerable to receiving information passively, without adequate verification and analysis processes. Therefore, critical reading is closely related to the development of critical thinking skills that include the skills of identifying biases, assessing the reliability of sources, and drawing logical conclusions (Facione, 2011b) In addition, critical reading is also an integral part of digital literacy, as students are required to be able to selectively navigate online information, filter relevant content, and utilize digital resources to support more reflective and meaningful learning (OECD, 2018).

Various research results show that students' critical reading skills in Indonesia and in many countries are still relatively low. The Programme for International Student Assessment (PISA) data consistently shows that Indonesian students' reading literacy skills are below the international average, including in the aspects of evaluating, interpreting, and reflecting on information (Summaries, 2018) Another study by Wardani and Sabardila found that many students are only able to understand reading literally and have difficulty identifying biases or validating arguments (Wardani & Sabardila, 2020). This condition is exacerbated by teachers' obstacles in integrating interactive literacy into learning. Silvester's research shows that most teachers do not have adequate competence to utilize digital technology in literacy activities, so the learning process tends to still be centered on printed texts and lecture methods (Silvester et al., 2022). In addition, the limited teaching materials specifically designed to support the development of interactive literacy are also a significant inhibiting factor (Behrman, 2006) Many learning materials have not integrated multimodal content, collaborative activities, and critical assessment. This lack of resources impacts students' low motivation and limited opportunities for them to practice critical reading in an authentic digital context (Wisudojati et al., 2024) These findings confirm that the development of planned, evidence-based interactive literacy is urgently needed to bridge students' critical reading skills gap with the demands of the 21st century.

Systematic Literature Review (SLR) has an important role in providing a solid foundation for educational research and practice because it is carried out with transparent, structured, and replicable procedures. SLR is needed to address the need for comprehensive knowledge mapping of interactive literacy in the development of critical reading skills, especially in the midst of numerous publications scattered in various

journals and research reports (Kitchenham & Charters, 2007; Siddaway et al., 2019) In contrast to traditional narrative literature reviews, SLR uses strict inclusion and exclusion criteria, a systematic study selection process, and a synthesis of findings analysis to produce more objective and accountable conclusions (Kitchenham & Charters, 2007). The main advantage of SLR is its ability to map trends, research gaps, and patterns of previous findings comprehensively, making a significant contribution to policy development, intervention design, and more up-to-date theoretical frameworks. In the context of interactive literacy, SLR becomes very urgent to identify learning models, approaches, or strategies that have proven to be effective in improving students' critical reading skills, as well as formulate recommendations that are empirically based and relevant to the needs of 21st century learning (Boell & Cecez-Kecmanovic, n.d.).

Although interactive literacy has been widely discussed in various studies on technology-based learning, studies that specifically map its contribution to the development of students' critical reading skills are still relatively limited (Jones & Hafner, 2021; Leu et al., 2015b). Many studies have focused only on aspects of increased motivation to learn or the use of digital media in general, but have not systematically examined how interactive elements—such as online collaboration, multimodality of text, and real-time interaction—contribute to the ability to evaluate, analyze, and reflect on information critically (Rowsell & Walsh, 2011b). In addition, there is a lack of synthesis of the latest research results that can be used as a basis for the development of an empirically tested interactive literacy learning model. As a result, teachers and education policymakers often face difficulties in designing learning interventions that meet the demands of high-level thinking skills in the digital age (O'Brien & Scharber, 2008). This research gap underscores the importance of Systematic Literature Review to compile, analyze, and synthesize relevant findings so as to provide evidence-based recommendations for more effective interactive literacy learning practices.

This study aims to describe the main findings from the relevant literature regarding the application of interactive literacy in the context of learning, especially related to the development of students' critical reading skills. In addition, this study also intends to identify best practices and various recommendations that have been proven effective in improving interactive literacy in the educational environment. Through the systematic mapping and synthesis of the results of previous research, this research is expected to provide a comprehensive theoretical and practical overview as the basis for the development of interactive literacy learning strategies, models, or interventions that are in accordance with the needs of schools in the digital era.

METHOD

This study uses a literature study using the systematic literature review (SLR) method. This method is often referred to as a literature review which is a literature review that aims to limit errors by identifying, assessing and synthesizing all relevant studies to answer a problem (Petticrew & Roberts, 2008). This literature review is a systematic review based on the original guidelines according to Kitchenham and Chartes (Kitchenham et al., 2006). Data sources are derived from journal articles and conference proceedings relevant to the research topic. The data source criteria include articles published within the last 5–10 years (2020–2024) to ensure relevance. Data sources were collected from databases: Google Scholar, DOAJ, Scopus, JSTOR, ProQuest Research Library, Taylor & Francis. Article search is carried out by combining several keywords

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that have been obtained with the help of Boolean operators (AND, OR), namely ("Critical Reading" OR "Literacy") AND ("Critical Thinking" OR "Literacy").

The inclusion criteria in this study include articles that specifically discuss the relationship between critical reading and literacy. The selected research focuses on qualitative methodologies or case studies that explore critical reading as part of critical reading. In addition, only publications written in Indonesian and English are considered for the relevance and readability of the research to be more widespread, more details can be seen in the following table:

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Open Access	Documents that publish with open access	Closed-access documents
Period	Publications in the range of 2020-2024	Publications before 2020
Document Type	Types of Articles	Types other than articles
Keywords	Literacy, critical reading	Selain Literacy, critical reading
Language	English	Other than English

After collecting data through scopus, the researcher used the PRISMA method by following the PRISMA stages of this study to ensure that the literature review process runs systematically and transparently (Moher D, Liberati A, Tetzlaff J, 2009). This stage begins with Identification, which is the collection of data sources from various databases using specific keywords such as literacy and critical reading, and avoiding duplication with the help of a reference manager. Next, the Screening stage is carried out by reviewing titles and abstracts to exclude irrelevant studies and only maintain articles according to the inclusion criteria. At the Eligibility stage, the articles that passed were selected more deeply based on the complete content, quality of the methodology, and relevance of the findings. The final stage is Selection, where the selected articles are recorded in a table containing important information and visualized using a PRISMA diagram (Liberati et al., 2009; Moher D, Liberati A, Tetzlaff J, 2009). The final results are presented in the form of a systematic report that summarizes the characteristics of the study, key findings, and a synthesis of the pattern of literacy contribution to critical thinking by ensuring the accuracy, transparency, and reproducibility of the research. Based on the search results on the scopus Publish and Perish page, 200 articles were found that discussed lieracy and critical reading. Here's a flow for a systematic review. The eligibility criteria in this study use inclusion criteria, namely article search criteria by means of (1) articles on literacy and critical reading, (2) publications between 2020-2024, (3) publications in accredited journals and scopus indexed journals, (4) complete text and open access.

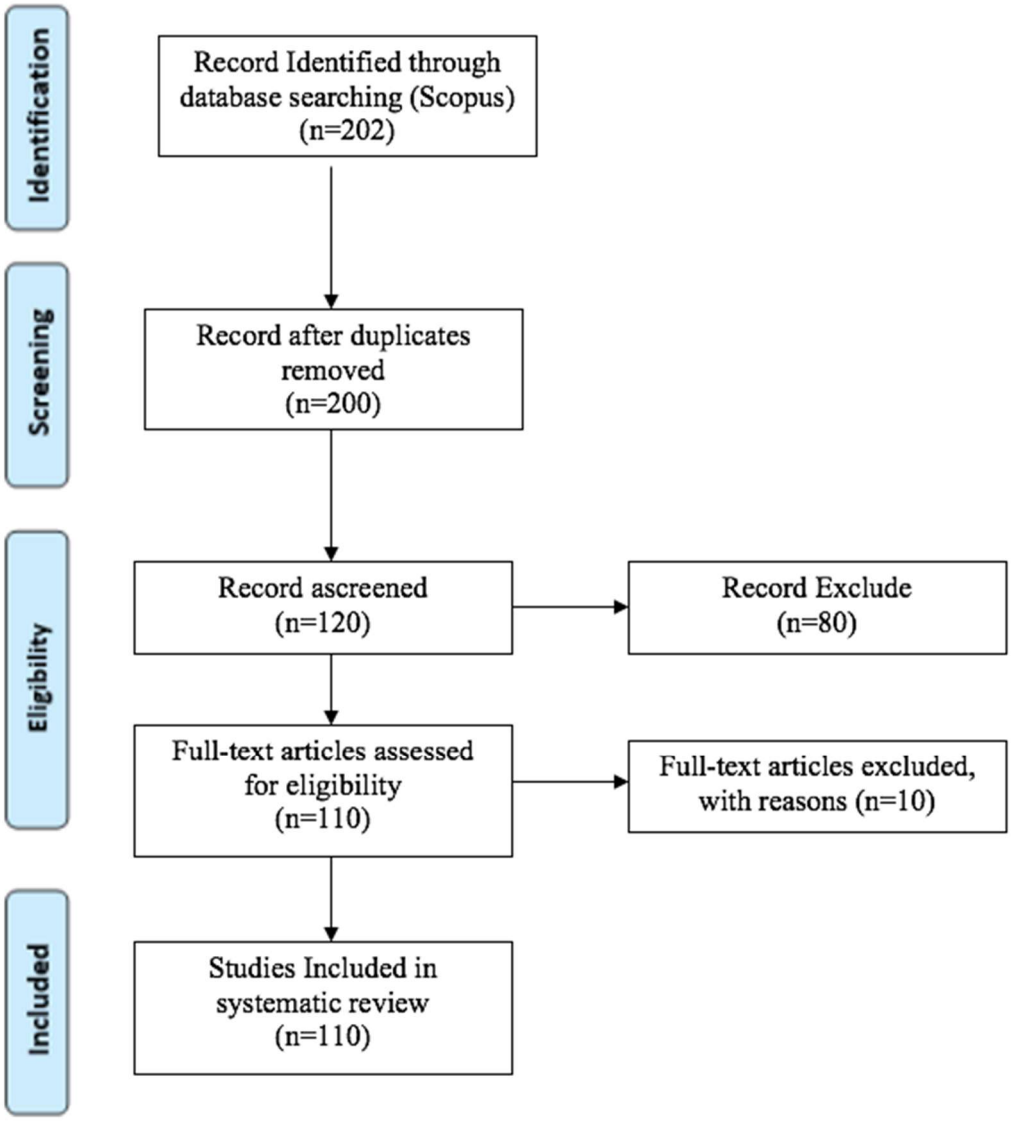

Figure 1. Flowchart for Systematic Review (Page & Moher, 2017)

Next, research questions are prepared that are designed to ensure that the systematic review is carried out to remain directed. This question was developed using the criteria of Population, Intervention, Comparison, Outcomes, and Context, which is summarized into PICOC (Kitchenham, 2007).

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Table 2. PICOC Structure for Research Questions Regarding Toponymy

Aspek	Content
Population	Primary or secondary school students who are the subject of the application of interactive literacy in critical reading learning
Intervention	The use of interactive literacy approaches, such as multimodal texts, digital platforms, collaborative activities, and technology-based learning strategies.
Comparison	Compare the effectiveness of interactive literacy with traditional literacy methods or conventional learning models in improving critical reading skills.
Outcomes	Identify key outcomes, such as improved critical reading skills, reflective thinking skills, and student learning motivation.
Context	The context of learning in the digital era, both in a formal school environment and hybrid or online learning.

After the description of the content of the PICOC aspect is known, the following research questions can be developed:

Table 3. Development of Research Questions

Code	Research Questions
RQ1	Which journals meet the inclusion criteria as publications that discuss interactive literacy in students' critical reading learning?
RQ2	What methods are most commonly used in interactive literacy research to develop critical reading skills?
RQ3	How is the distribution of research contexts (country, level of education, subjects) in journals that meet the inclusion criteria?
RQ4	What are the main findings and significant contributions of each journal regarding the influence of interactive literacy on strengthening critical reading skills?
RQ5	What are the general conclusions and implications of the findings of the entire article on the development of interactive literacy practices in students' critical reading learning?

RESULTS AND DISCUSSION

The search yielded 110 selected articles. The scopus database is used to collect data. Titles relevant to "literacy", and "critical reading" are used in data collection. The search for data is focused on publications from journals or conferences. The statistics of the Journal that meet the requirements found can be observed in Table 2.

Table 4. Number of Articles Categorized by source (Top 10)

Source	Frequency
Reading Research Quarterly	8
Journal of Adolescent & Adult Literacy	6
Journal of Literacy Research	5
Journal of Research in Reading	4
Journal of Education and Information Technologies	4
Journal of Literacy and Technology	4
Journal Literacy Research and Instruction	4
Journal Educational Technology Research and Development	3
International Journal of Educational Research	2
Journal of Language and Literature	2

Research on reading and critical reading has been conducted using various research methods to explore the relationship between the two.

Table 5. Number of Articles Categorized by Research Method

No	Research methods	Number of Articles
1	Experimental Studies/Experimental Research	28
2	Quasi-Experimental Studies	22
3	Case Studies	18
4	Survey/Questionnaire	16
5	Content Analysis/Document Analysis	14
6	Mixed Method	12
Total		**110**

The distribution table of research methods shows that in the systematic literature review on interactive literacy for the development of critical reading skills, the experimental study approach or experimental research is the most dominant method used, with the number of articles reaching 28 publications. This reflects the tendency of researchers to assess the effectiveness of interactive literacy interventions empirically through controlled treatment designs, such as the use of digital media, interactive learning applications, or collaborative reading activities in measured classroom situations.

The quasi-experimental method ranked second with 22 articles, suggesting that many studies also chose intervention designs without full randomization, but still involved control groups and experiments to compare learning outcomes. Case studies emerged as the third widely used method (18 articles), as researchers often conducted in-depth studies of interactive literacy practices in specific schools to explore the dynamics of implementation contextually.

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In addition, surveys or questionnaires were used in 16 articles to collect data on the perception of teachers, students, or education stakeholders related to the experience of using interactive literacy. The method of content analysis or document analysis is recorded in 14 articles, mainly to review teaching materials, digital modules, or learning products that support critical reading skills. Finally, there are 12 articles that use mixed methods by combining quantitative and qualitative data, to obtain a more holistic picture of the impact of interactive literacy.

This distribution shows that research approaches in this area are quite varied, but generally emphasize empirical validation and contextual descriptions to ensure the effectiveness of interactive literacy practices in improving students' critical reading skills.

Table 6. Number of Articles Categorized by Research Place

No	Research methods	Number of Articles
1	United States	28
2	English	18
3	Australia	15
4	Chinese	12
5	Canada	8
6	Indonesia	6
7	Malaysia	5
8	Philippines	4
9	Netherlands	3
10	India	3
11	Turkey	2
12	Brazil	2
13	Germany	2
14	France	1
15	Russia	2
Total		**110**

The article distribution table shows that the United States is the country with the largest research contribution in interactive literacy and critical reading skills, with a total of 28 articles in the period 2020–2024, followed by the United Kingdom with 18 articles and Australia with 15 articles, reflecting a strong research tradition in the field of digital literacy and learning innovation. China also showed a significant contribution with 12 articles, while Canada contributed 8 articles, followed by Indonesia with 6 articles indicating the growing attention of researchers to this topic in Southeast Asia. Malaysia and the Philippines have 5 and 4 articles, respectively, while European countries such as the Netherlands, Germany, and France recorded more limited contributions, ranging from 1 to 3 articles. India, Turkey, Brazil, and Russia were also recorded to conduct research although the number was relatively small. This distribution shows that interactive literacy research is increasingly becoming a global concern, but the dominance of publications remains in countries with established research infrastructure and progressive education policies in integrating technology, while opening up opportunities to strengthen research in developing countries such as Indonesia.

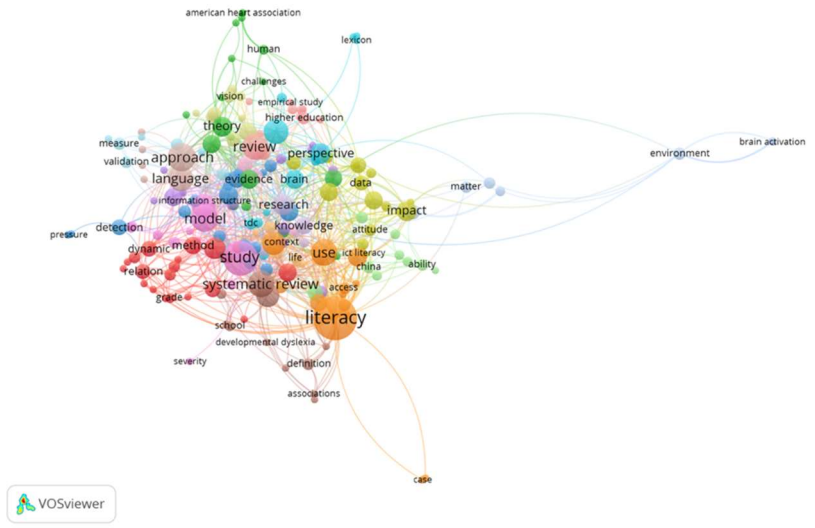

Figure 2. Correlation between Titles in Literacy and Critical Reading Review

This visualization of VOSviewer shows a map of the keyword network that dominates research related to interactive literacy and critical reading in systematic literature review. It can be seen that the term literacy emerges as a central node with broad connections to other themes, such as systematic review, study, use, and impact, which shows the research focus on evaluating the impact of interactive literacy in various educational contexts. The keywords language, model, and approach describe a significant attention to approaches and models of technology-based literacy application to support critical thinking skills. Other adjacent clusters, such as knowledge, data, context, and attitude, reflect the sociocultural and dispositional dimensions that affect the development of interactive literacy, including students' attitudes towards the use of technology.

In addition, the keywords ICT literacy and higher education show that interactive literacy is not only researched at the elementary or secondary school level, but also at the higher education level. The relationship between themes in this visualization shows that interactive literacy research is multidisciplinary, including cognitive aspects (e.g. brain, ability), pedagogical (approach, model), and empirical evaluation through systematic review and empirical study. Smaller nodes such as developmental dyslexia and school show special attention in the context of learning difficulties and basic education. The distribution of tight networks and inter-nodes confirms that interactive literacy is understood not just as a technology-based reading practice, but as a complex process that involves the development of knowledge, critical attitudes, and multimodal understanding relevant to the challenges of the 21st century.

The citation trend for articles published between 2020 and 2024 reveals ups and downs. It can be seen in the following graph:

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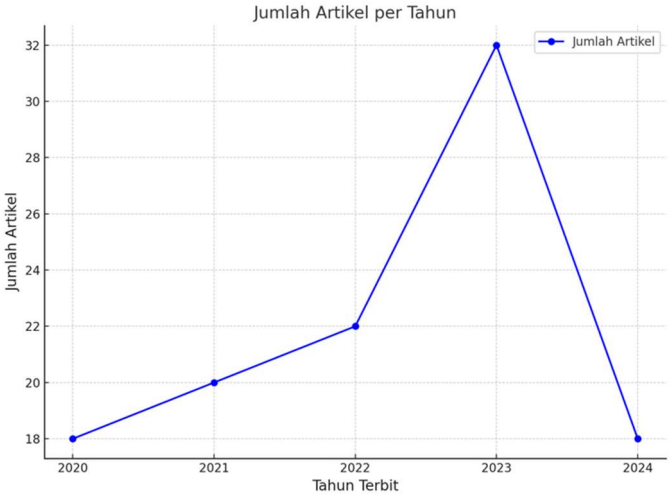

Figure 3. Title Trends in Critical Reading Review Every Year

This graph shows the trend in the number of articles published per year from 2020 to 2024, with a gradual increase from 18 articles in 2020 to 22 articles in 2022. A significant spike was seen in 2023, where the number of articles jumped sharply to 32, reflecting increased productivity or high attention to interactive literacy topics and critical reading skills. However, in 2024 there will be a drastic decrease back to 18 articles, equivalent to the number of publications in 2020. Based on the search strategy on various scientific journal databases, various findings from research related to interactive literacy in the development of students' critical reading skills at various levels of education and cultural contexts can be found. These studies explore the role of interactive literacy as a learning approach that combines multimodal texts, digital technology, and collaborative interaction to improve comprehension and critical evaluation skills of information. In addition, research on digital literacy also shows the importance of reflective thinking skills in dealing with the flood of information in the internet era. Each research has a different focus, ranging from the effectiveness of interactive literacy models, the influence of learning motivation, to the challenges of technology integration in learning.

Variations of Literacy Strategies

The results of the literature review show that the development of critical reading skills through literacy requires the application of various complementary strategies. Project-Based Learning has emerged as one of the dominant approaches because it emphasizes authentic and contextual learning experiences. In literacy projects, students actively design reading assignments that connect to real life, for example compiling text evaluation reports, creating reflective portfolios, or presenting the results of reading analysis. This strategy is in line with the theory of constructivism put forward by Vygotsky (1978), which emphasizes the importance of zones of proximal development and social interaction in building new understandings. Literacy projects provide space for collaboration, discussion, and mentorship that help students internalize critical reading strategies.

These studies used a variety of approaches such as experiments, case studies, surveys, and mixed methods, with data collection techniques that included classroom observation, document analysis, in-depth interviews, and questionnaires. The results

provide in-depth insights into how interactive literacy is not only a teaching strategy, but also a means of building critical thinking skills, strengthening digital literacy, and preparing students for the demands of the 21st century.

In addition, group discussions are an important strategy that has been proven to support the development of critical thinking skills. When students discuss, they not only uncover literal understanding, but also learn to identify points of view, examine evidence, and test the validity of arguments in the text. This is in accordance with the concept of sociocultural theory which states that understanding develops through dialogical interaction (Bakhtin, 1981). Some research shows that systematically structured group discussions, for example through guiding questions and moderator roles, help students build metacognitive awareness of the way they read and interpret information.

Another strategy that is also widely studied is multimodal text-based learning. While literacy doesn't have to be digital, the integration of various reading formats—narrative text, infographics, data tables, and images—is reported to enrich students' understanding of reading material. This is in accordance with the multimodality framework put forward by Kress and van Leeuwen (2001), which emphasizes that meaning is not only constructed through verbal language, but also through visual and symbolic elements. In the context of critical reading learning, multimodal texts help students recognize the relationships between representations, evaluate the credibility of sources, and develop more comprehensive interpretations.

The results of the study also found that a reflective approach plays an important role in strengthening critical awareness. Individual reflection, for example through reading journals or personal response notes, helps students connect the text with their own experiences and values. This approach is in line with metacognitive theory (Flavell, 1979), which emphasizes that awareness of one's own thought process is an essential component of critical thinking skills. By reflecting, students become better able to monitor their comprehension, recognize perceptual biases, and assess the extent to which they understand the text in depth.

In general, the diversity of literacy strategies found in this study—ranging from project-based learning, group discussions, the use of multimodal texts, to reflective activities—contributed significantly to improving students' learning motivation and cognitive engagement. These findings support the view of New Literacy Studies (Street, 1984) which views literacy as a contextual, dynamic, and meaningful social practice, not just a technical ability to read. Therefore, the application of varied and adaptive literacy strategies is the main key in building critical reading skills that are relevant to the challenges of 21st century education.

Contextual Factors Influencing Success

The results of the study show that the success of literacy is not only determined by learning strategies, but also greatly influenced by various contextual factors that underlie the implementation process. One of the main factors is the readiness of infrastructure, including the availability of technological devices that support contemporary literacy activities. The perspective of Ecological Systems Theory put forward by Bronfenbrenner (1979) emphasizes that the physical environment and institutional policies play an important role in shaping learning experiences. Schools that have adequate access to devices such as computers, tablets, and a stable internet connection tend to be more successful in integrating multi-source literacy. On the contrary, limited facilities are often the main obstacles that make the implementation of literacy, both printed and digital-

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based, not run optimally. This condition shows the importance of government support and the provision of a supporting ecosystem so that literacy activities can take place evenly in various regions.

In addition to the infrastructure aspect, teacher competence is also an important determinant in the success of critical literacy development. The Pedagogical Content Knowledge Theory (Shulman, 1986) states that mastery of the material must be balanced with pedagogical understanding so that teachers are able to facilitate the learning process effectively. Teachers who have a deep understanding of the literacy approach, are able to design reflective activities, and are skilled in guiding critical discussions will find it easier to help students develop deep reading skills. Research has found that ongoing professional training and teacher learning community support play a significant role in increasing educators' confidence in implementing varied literacy. This is in line with the principles of Communities of Practice (Lave & Wenger, 1991), which emphasizes the importance of professional collaboration networks in enhancing teachers' pedagogical capacity.

Another factor that is no less important is the level of initial literacy and student readiness. The Constructivist Learning Theory perspective (Vygotsky, 1978) emphasizes that students' early abilities become the foundation for developing higher-level thinking skills through scaffolding and social interaction. Students with strong basic literacy show more significant development when participating in project-based learning or group discussions, because they already have the cognitive capital to process complex information. These findings also support the Zone of Proximal Development theory, which explains that learning success occurs when literacy activities are at a level of challenge that slightly exceeds the actual ability of students but can be achieved with teacher support. Countries with comprehensive literacy policies, such as the United States, the United Kingdom, and Australia, report more consistent results due to a systematic approach to building a literacy culture from primary education. This emphasizes that effective literacy requires synergy between technological readiness, teaching quality, and literacy policies that support equitable access to learning.

CONCLUSION

This systematic literature review shows that interactive literacy has great potential in developing students' critical reading skills at various levels of education. The results of the analysis of 110 international articles published in the 2020–2024 period show that the interactive literacy approach, through the integration of multimodal texts, collaborative discussions, project-based learning, and reflective activities, has proven to be effective in improving the ability to evaluate information, recognize biases, and formulate critical interpretations. The success of the implementation of this strategy is consistently influenced by the readiness of infrastructure, teachers' pedagogical competence, and the level of students' initial literacy, which emphasizes the importance of supporting education policies and providing a conducive learning ecosystem.

The study also found that the majority of studies used experimental and quasi-experimental approaches to measure the impact of interventions empirically, as well as case studies and surveys to understand the dynamics of literacy implementation in local contexts. The geographical distribution of publications shows the dominance of contributions from countries with strong digital literacy research traditions, such as the United States, the United Kingdom, and Australia, while developing countries are beginning to show increased attention despite still facing challenges of equitable access

to technology and resources. Visualization of the keyword network through VOSviewer shows that the theme of interactive literacy is closely related to the pedagogical, cognitive, and sociocultural dimensions, which confirms the multidisciplinary nature of this study.

In general, the findings of this study support the view of literacy as a dynamic social practice, not just a technical reading skill. The practical implications of this study are the importance of strengthening teacher capacity through professional training, the development of contextual learning models, and literacy policies that ensure equitable distribution of facilities and access. This study also underscores the need for more in-depth follow-up research on interactive literacy models that are adaptive to local contexts and student needs in the digital age. Thus, interactive literacy can be optimized as a learning strategy that is able to equip students with critical thinking skills that are relevant to facing the challenges of the 21st century.

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