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VIRTUAL SPARKS, DIGITAL MIND: INTEGRATING DIGITAL LITERACY FOR EFL JUNIOR HIGH SCHOOL STUDENTS

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ABSTRACT

The continuous development of digital technology has created new challenges for English as a Foreign Language (EFL) instruction. However, reading instruction in many Indonesian junior high schools continues to emphasize literal comprehension and vocabulary learning, providing limited opportunities for developing critical thinking. This study aimed to develop a digital literacy-based learning model to enhance students' critical thinking skills and reading comprehension in EFL classrooms and to examine students' perceptions of the model. A Research and Development (R&D) approach integrated with a one-group pretest–posttest design was employed, involving 25 seventh-grade students. Quantitative data were analyzed using descriptive statistics and the Wilcoxon Signed-Rank test, while qualitative data were collected through student perception questionnaires. The results revealed significant improvements in both critical thinking ($Z = -4.423$, $p < 0.001$) and reading comprehension ($Z = -4.353$, $p < 0.001$). Expert validation yielded a feasibility score of 97.67%, indicating that the model was highly suitable for classroom implementation. Students also demonstrated higher posttest scores and expressed positive perceptions of the use of digital texts and multimodal learning resources. These findings suggest that the developed model is an effective approach for improving critical thinking and reading comprehension in EFL learning.

Keywords: Critical Thinking Skills, Digital Literacy, EFL Learning, Reading Comprehension

A. INTRODUCTION

The advancement of digital technology has had a substantial impact on educational practices, particularly in teaching and learning English as a Foreign Language (EFL). EFL refers to a process of acquiring English in contexts where it is not used as the primary language of daily communication, and therefore depends largely on structured classroom instruction, meaningful exposure to the language, and an interactive learning environment (Brown & Lee, 2025; Richards, 2017). Effective EFL learning requires a systematic instructional approach that combines language development, digital literacy, and critical thinking to support meaningful comprehension and language use (Li, 2023). Consequently, incorporating digital literacy into EFL instruction has become essential for preparing

learners to meet the competencies required in the 21st century (Falloon, 2020; Tinmaz et al., 2022). The transformation of education in the field of digital technology, including digital literacy, is driving the emergence of technology application scenarios within new pedagogical paradigms (Feng & Sumettikoon, 2024). Despite its importance, the implementation of digital literacy and critical thinking in EFL education in Indonesian classroom practice is relatively limited (Indah et al., 2022; Rozali et al., 2022; Sudirman et al., 2025). Many English lessons, not only in Indonesia but throughout the world, such as Iran and Turkiye, still depend on traditional teacher-centered approaches, including reading comprehension (Moghadam et al., 2023; Orhan, 2024; Rozali et al., 2022). In addition, current practices frequently prioritize the use of digital tools without being supported by well-structured learning models. that effectively integrate digital literacy with reading comprehension and critical thinking skills (Li, 2023; Sudirman et al., 2025). However, this study primarily examined digital literacy with Digital Information Verification (DIV) as a general competency rather than as a structured instructional model integrated into EFL critical thinking skills and reading comprehension.

Several previous studies have consistently demonstrated that innovative instructional approaches can enhance students' learning outcomes in EFL contexts, particularly in terms of critical thinking, reading comprehension, and classroom engagement. Although these studies share the common objective of promoting active and meaningful learning, they employ different pedagogical strategies to achieve this goal. For instance, Hendriana et al. (2018) reported that the implementation of Problem-Based Learning (PBL) encouraged students' active participation, creativity, self-confidence, and collaborative problem-solving skills. Similarly, Moghadam et al. (2023) found that the 3Es (Exposure, Exploration, and Evaluation) intervention significantly improved Iranian EFL learners' critical thinking, reading comprehension, and attitudes toward the classroom environment. Meanwhile, Mohseni et al. (2020) and Mulyani et al. (2020) emphasized the role of metacognitive strategies, highlighting that planning, monitoring, and evaluating learning processes enable students to become more reflective and autonomous learners. In addition, Sudirman et al. (2025) argued that digital technologies and multimedia resources can increase learners' engagement and facilitate language learning when effectively integrated into classroom instruction. However, a clear gap remains. There is still a lack of an integrated instructional model that systematically combines digital literacy, critical thinking, and reading comprehension in EFL classrooms.

Despite these encouraging findings, the existing studies remain fragmented in their instructional focus. Some primarily emphasize problem-solving pedagogy (Hendriana et al., 2018), others concentrate on explicit critical thinking interventions (Moghadam et al., 2023) or metacognitive regulation (Mohseni et al., 2020; Mulyani et al., 2020), while research on digital literacy tends to examine the use of digital tools as learning media rather than as an integrated pedagogical framework (Sudirman et al., 2025). Consequently, limited attention has been given to developing a comprehensive instructional model that systematically integrates digital literacy practices, critical thinking processes, and reading comprehension instruction within a coherent learning design. This gap is particularly evident in Indonesian junior high school EFL contexts, where teachers continue to face challenges in implementing digital literacy beyond the technical use of technology. Therefore, the present study addresses this gap by developing a Digital Literacy-Based Learning Model that integrates Digital Information Verification (DIV) into the Problem-Based Learning framework, enabling students not only to access digital information but also to critically verify, evaluate, and utilize it to solve authentic reading problems. Effective reading instruction should

support students in identifying main ideas, interpreting supporting details, and critically evaluating textual information (Duke et al., 2011). The theoretical framework of this study was built upon the integration of constructivism, Problem-Based Learning (PBL), digital literacy, reading comprehension, and critical thinking. Constructivist learning theory, particularly the views of Jean Piaget and Lev Vygotsky, provides the philosophical foundation by emphasizing that learners actively construct knowledge through meaningful interaction with their environment rather than passively receiving information. Consistent with this perspective, the Problem-Based Learning model facilitates student-centered learning by engaging learners in authentic problem-solving activities that require inquiry, collaboration, and reflection. Piaget emphasized that learning is an active process in which learners construct knowledge through interaction with their environment (Pedapati, 2021). Meanwhile, Vygotsky highlighted the importance of social interaction, cultural tools, and collaborative learning in shaping knowledge construction (Pedapati, 2021). According to this perspective, learning occurs through guided interaction and shared experiences, which play a crucial role in cognitive development.

In this research, the researcher adopted the stages of the Problem-based Learning Model (Iswandari et al., 2017), they are: (1) learners orientation to the problem, (2) organizing the learners, (3) Guiding the investigation of individuals and groups, (4) developing and presenting students' work, and (5) analyze and evaluate the problem solving process, to design a structured intervention, combining it with Digital Literacy frameworks adopted Information literacy and technological literacy from Reddy et al. (2023). These two digital literacy frameworks are mainly noticed in the cognitive development of students nowadays. Students engage in exploring digital texts, solving contextual problems, and verifying information through the Digital Information Verification (DIV) stage, emphasizing active knowledge construction rather than passive reception. Moreover, improving students' language skills could not be separated from other 21st-century soft skills, for example, critical thinking skills. Furthermore, Critical thinking skills allow students to move beyond surface-level understanding toward deeper procedures such interpretation, analysis, and evaluation of textual content (Paul & Elder, 2020, in O'reilly et al, 2022). Incorporating critical thinking activities into language instruction can significantly improve students' reading comprehension and analytical skills (Shirkhani & Fahim, 2011; Kamgar & Jadidi, 2016). The Critical thinking skills aspects followed the very core concepts from Facione (2015): analysis, evaluation, explanation, interpretation, inference, and self-regulation. Meanwhile, four elements of reading comprehension were measured in this study: main idea, vocabulary in context, supporting details, and structure of the text (Duke et al., 2011; Namaziandost et al., 2020; Snow, 2002; Rose & Martin, 2012).

Furthermore, this study is expected to advance EFL teaching practices by providing an empirically validated model that supports teachers in fostering critical thinking and reading comprehension within digital learning environments. To provide a comprehensive understanding, this study addresses the following research questions:

1. How is the process of developing a digital literacy-based learning model to enhance critical thinking skills and reading comprehension among EFL Junior High School students in Subang?
2. What is the effect of developing a digital literacy-based learning model to enhance critical thinking skills for 7th-grade EFL junior high school students in Subang?

3. What is the effect of developing a digital literacy-based learning model to enhance reading comprehension for 7th-grade EFL junior high school students in Subang?

How do 7th-grade EFL Junior high school students perceive the attractiveness and usefulness of the digital literacy-based learning model in supporting their learning of critical thinking and reading comprehension?

B. METHOD

This study employed a Research and Development (R&D) approach to design, refine, and evaluate the digital literacy-based learning model. The procedures were adopted from the model proposed by Walter R. Borg and Meredith D. Gall (1983) (Hendriyani, 2019), integrated with an experimental approach and survey research, in order to develop and evaluate the developed learning model. This design was selected due to its systematic, structured, and practical procedures, which are particularly suitable for developing and validating educational products in real classroom contexts. This study was conducted at a junior high school in Subang during the 2025/2026 academic year. In addition, the participants in this study represent Junior High School EFL students with relatively limited exposure to digital literacy–based learning in their English classrooms. Twenty-five seventh-grade students, aged 11 to 12 years old, with a combination of 15 girls and 10 boys, from a single class were selected through convenience sampling based on accessibility, as the researcher was directly involved in teaching the class, and on their readiness to participate in digital learning activities. As first-year junior high school students, they had heterogeneous levels of English proficiency, with most demonstrating limited English proficiency. This condition was attributed to their diverse educational backgrounds and the limited exposure to English instruction during elementary school, as English is no longer a compulsory subject at that level in Indonesia. However, this had some limitations, as the study was conducted in a single class from one school. Since the participants were drawn from a single intact class in one junior high school and were not selected through probability sampling, the results may not represent the characteristics or learning outcomes of all Indonesian junior high school EFL students. This involvement enabled consistent implementation of the instructional treatment and close monitoring of students' learning activities throughout the research period.

Ethical considerations were observed throughout the research process to ensure the protection of participants' rights and well-being. Prior to conducting the study, official permission was obtained from the principal of SMPN 2 Pusakajaya to implement the research activities in the selected classroom. Since the participants were seventh-grade students under the age of 18, informed consent was obtained from their parents or legal guardians before data collection commenced. The students were also informed about the purpose of the study, the learning activities involved, and their role as research participants. Participation in the study was voluntary, and students were assured that their decision to participate or withdraw would not affect their academic grades or classroom treatment. Furthermore, all data collected were treated confidentially and used solely for research purposes. To protect participants' privacy, students' identities were anonymized during data analysis and reporting.

The research procedure followed a series of systematic R&D stages in Figure 1 below.

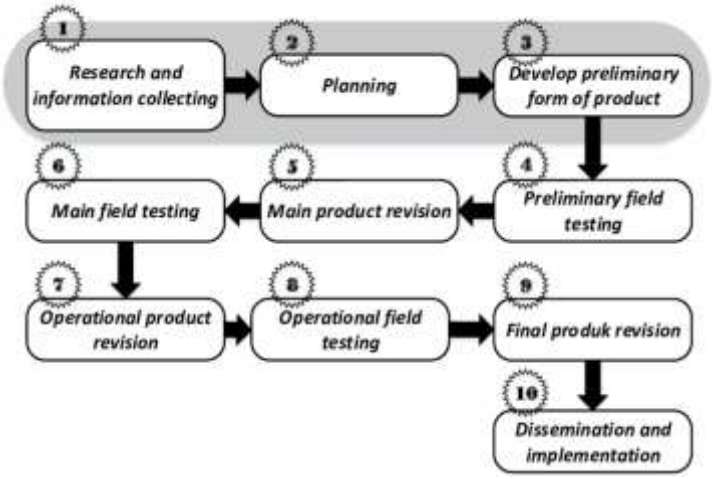


Figure 1. The process of Research and Development (R n D) design adopted from Borg and Gall, 1983

The development process followed a series of iterative stages adopted from the R&D approach. These stages included: (1) initial needs analysis, (2) planning instructional objectives and learning design, (3) developing a preliminary prototype, (4) preliminary field testing, (5) revision the initial product, (6) main field testing, (7) refinement of the operational product, (8) operational field testing, (9) final revision, and (10) dissemination of the finalized model.

Data were collected using three instruments: (1) expert validation checklists to evaluate the feasibility of the model, including a validation instrument for the digital literacy-based learning model, Evaluation instrument for critical thinking skills, and evaluation instrument for reading comprehension, (2) multiple-choice questions for pretest and posttest assessments to measure students' critical thinking skills and reading comprehension before and after the implementation of the model, and (3) a 20-items Likert-scale questionnaire to investigate students' perceptions of the learning model. These instruments were constructed based on established theoretical frameworks. The content validity of the developed learning model and research instruments was established through expert judgment. Three experts participated in the validation process, including an ICT expert, a content expert in English Language Teaching, and an evaluation instrument expert. Each expert reviewed the learning model, lesson plans, materials, students' assessment, and questionnaire protocol using structured validation sheets. The experts evaluated several aspects, including content relevance, instructional design, language clarity, alignment with the research objectives, and the suitability of the assessment instruments.

Data analysis in this study was conducted using both statistical and descriptive analyses. Multiple-choice pretest and posttest data analysis were performed using SPSS v.27, while students' questionnaire analysis was based on descriptive statistics. Prior to hypothesis testing, the normality of the pretest and posttest data was examined using the Shapiro-Wilk test. As the data were not normally distributed, a Wilcoxon Signed-Rank test was applied to determine the significance of differences between pretest and posttest scores. Meanwhile, the 5-point Likert scale questionnaire data were analyzed descriptively by calculating mean scores using Microsoft Excel and categorizing them into interpretation levels "strongly disagree" – "strongly agree". This method is commonly used in educational and EFL research (Li, 2023). The data were summed and averaged to group them based on each category. Furthermore, Expert validation data were analyzed descriptively by using Microsoft Excel to assess the feasibility of the developed model. The pretest and posttest

employed well-designed multiple-choice questions (MCQs) to assess higher-order thinking skills rather than factual recall. Based on Facione's (2015) critical thinking framework, the items required students to interpret information, analyze ideas, make inferences, evaluate evidence, and draw conclusions from reading passages. While the MCQ format served as the response method, it effectively measured critical thinking by providing four choices in each question. It was appropriate since each choice had one most correct answer, which showed each aspect of critical thinking.

Through these procedures, the study ensured that the developed model was systematically designed, appropriately validated, and empirically tested, providing a reliable basis for examining its effectiveness in enhancing students' critical thinking skills and reading comprehension in EFL contexts.

C. FINDINGS AND DISCUSSION

Findings

1. The process of developing the Digital Literacy-Based Learning Model

The development of a digital literacy-based learning model followed some rules adopted from the R&D design, which consisted of ten phases. The process began with a needs analysis, which identified key challenges faced by students, particularly in understanding English text and engaging actively in reading activities. This involved giving students a questionnaire containing 35 statements with a yes-no answer. The needs analysis questionnaire was given to 24 students in grade 7.



Figure 2. Item 3 Students' Need Analysis Questionnaire Result

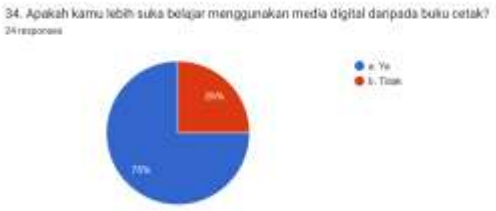


Figure 3. Item 34 Students' Need Analysis Questionnaire Result

The questionnaire highlighted students' difficulties in learning English. The finding showed that the majority of students struggled to comprehend text written in English. The primary reasons they cited were a lack of knowledge of English and the intricacy of the material, which made it challenging to interpret (item 3). The result showed 75% of students believe that digital media is more engaging and easier to use than printed books, 25% of students prefer to learn through traditional books (item 33).

Based on the initial finding above, the planning stage focused on defining instructional objectives and selecting appropriate digital tools to support learning. Interactive digital learning media, such as *YouTube videos*, *Canva*, and *Blooket*, were chosen to fulfill the challenge of developing a digital literacy-based learning model. The preliminary version of the model was then designed to incorporate elements of digital literacy, critical thinking tasks, and problem-based activities.

Following the design phase, the prototype was evaluated through expert validation. The experts assessed the model in terms of content relevance, instructional clarity, and technological use, using a closed-ended questionnaire with a 5-point Likert scale, were used in this stage to evaluate the prototype. The input was then used to revise and improve the model before it was implemented in a real classroom setting.

Table 1. Expert validation score: Feasibility of the product

Validator	Total Score	Max. Score	Percentage	Explanation
ICT Expert	28	30	93%	Feasible to use with revision
Content Expert	15	15	100%	Feasible to use without revision
Evaluation Instrument Expert	50	50	100%	Feasible to use without revision
Average			97,67%	Highly feasible

The fourth step involved a preliminary field test, which tested the preliminary product on a small group of 7 students randomly to evaluate its usability and practicality. Through direct observation during this phase, I found that the students' attention was good. This can be seen from as many as 5 out of 7 students who focused on using digital media in the class. 4 out of 7 students also actively participated during the class.

Tabel 2. Students Questionnaire of students Behavior in Preliminary Test

Student	Focus	Active	Score	Explanation
Student 1	√	√	Good	Student paid good attention and actively participated.
Student 2	√	√	Good	Student paid good attention and actively participated.
Student 3			Not enough	Student has no interest in the learning process.
Student 4	√		Not enough	Student paid good attention, but did not actively participate.
Student 5	√	√	Good	Student paid good attention and actively participated.
Student 6			Not enough	Student has no interest in the learning process.
Student 7	√	√	Good	Student paid good attention and actively participated.

After the fourth step, this research moved to the main product revision. The revision in this stage was for learning purpose, from "… menuliskan urutan langkah-langkah atau tahapan dari sebuah teks prosedur…" to *"... menentukan urutan sebuah resep dengan tepat dan bernalar kritis."* Adjusting the syntax was also done in this step. In this step, the novelty of the research came up. "Digital Information Verification" (DIV) was added as the sub-syntax at the learning stages.

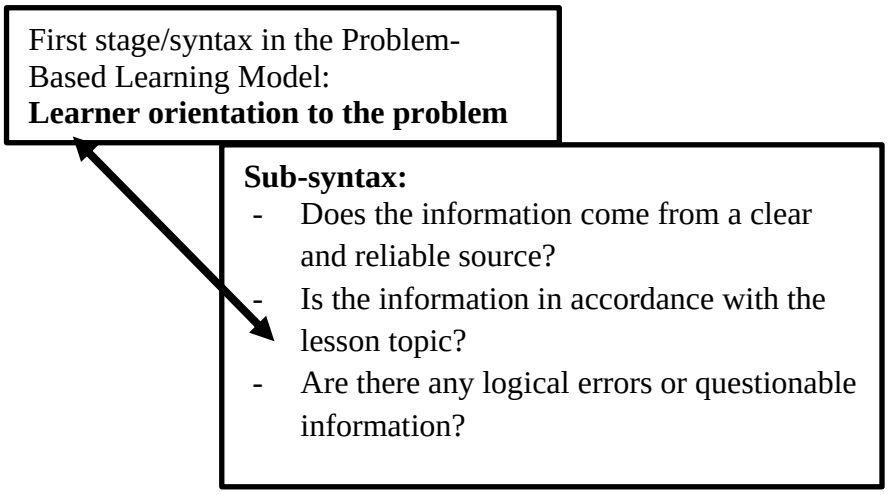


Figure 4. Lesson Plan

Tabel 3. The Difference of Original PBL Syntax with the Digital Literacy-Based Learning Model

Original PBL Stage	Digital Literacy-Based Learning Model
Students' orientation to the problem: Students understand the problem	Students' orientation to the problem with Digital Information Verification (DIV): Students understand the problem and verify the credibility, relevance, and accuracy of the digital source and materials

The revised model was implemented in an actual classroom setting (main field testing) involving 25 seventh-grade students. Before the class, a pretest assessment was given to students. During this phase, students participated in learning activities utilizing digital tools such as *Canva*, *YouTube*, and *Blooket* to support reading comprehension and critical thinking tasks.



Figure 5. Learning Material in Canva: https://canva.link/fox1xqw4m0clvhm



Figure 6. YouTube Video: https://www.youtube.com/watch?v=8hn2RPMSaiY



Figure 7. Quiz: https://www.blooket.com

The seventh step in this research involved operational product revision. Based on feedback from the main field testing, additional refinements were made to strengthen the instructional design, enhance student engagement, and optimize the instructional design. The selection of clearer digital media was emphasized to support learning effectiveness. Further, the students' worksheets were revised to provide more challenging tasks, consisting of four distinct recipe-based activities assigned to different student groups.



Figure 8. Final Student Worksheet 1-4

The eighth stage of the study involved operational field testing, during which the revised model was implemented to examine its effectiveness in a real classroom setting. The posttest assessment was conducted here, while the results were used to measure differences in student learning outcomes after the implementation of the treatment. Additionally, the students' questionnaire was given here. 20 items were put on the questionnaire. The questionnaire was accompanied by a 5-point Likert scale, which described what students themselves actually felt and preferred in the English classroom with the learning model applied.

The ninth stage focused on the final revision of the learning model based on the findings obtained during the operational field testing. Since there is no additional revision for the developed model, the final product is done. The finalized model was implemented in another classroom setting. The product was also disseminated through school learning communities at SMPN 2 Pusakajaya Kabupaten Subang. The dissemination was attended by all subject teachers, the school principal, and the supervisor of SMPN 2 Pusakajaya. Additionally, the result of this research was used to join the Subang Innovation Festival "*ASN Berprestasi Kategori Inovatif*" in 2025.

The iterative nature of this development process ensured that the final product was not only theoretically grounded but also practically applicable.

2. The effect of the developed model on students' critical thinking skills

The first step to measure the effect was to conduct a normality test, and the result was as follows:

Table 4. Test of Normality of Critical Thinking Skills MCQs

	Significancy
Pretest	0,004
Posttest	0,006

While the median score of the critical thinking test showed the improvement of students' critical thinking skills by the intervention of the developed model as follows:

Table 5. Median Score of Students' Critical Thinking Skills

	Pretest	**Posttest**
Median	42	67

The data were examined for a normality test, which indicated that the distribution did not meet the assumption of normality (pretest sig. = 0,004, posttest sig. 0,006 < p 0,05). Therefore, the non-parametric statistical procedure, the Wilcoxon Signed-Rank Test, was employed to examine the difference between pretest and posttest scores.

Tabel 6. Wilcoxon Test of Critical Thinking Skills: Pretest vs. Posttest Scores

	Posttest-Pretest
Z	-4.423
Asymp. Sig. (2-tailed)	<0,001

The result of the test showed a statistically significant difference between students' performance before and after the intervention ($p < 0.001$), indicating the learning model contributed to the enhancement of students' critical thinking skills. In addition, this result was reinforced by the result of effect size (Cohen, 1988) as follows:

$$r = \frac{Z}{\sqrt{N}} = \frac{4{,}423}{\sqrt{25}} = 0{,}885$$

*r = effect size

Z = Wilcoxon Z Statistic

N = Number of Participants

According to Cohen (1988), r > 0,50 indicating large effect. This can be concluded from r = 0.885, indicating a large effect of the digital literacy-based learning model on students' critical thinking.

3. The effect of the developed model on students' reading comprehension

The result of the study demonstrated a substantial improvement in students' reading comprehension after the implementation of the model. Students showed noticeable progress in identifying main ideas, understanding supporting details, and interpreting texts.

Tabel 7. Test of Normality of Pretest and Posttest in Reading Comprehension MCQs

	Significancy
Pretest	0,175
Posttest	0,014

While the median score of the reading comprehension test showed the improvement of students' reading comprehension by the intervention of the developed model as follows:

Table 8. Median Score of Students' Critical Thinking Skills

	Pretest	**Posttest**
Median	50	75

Since the normality test showed 0,014 for the posttest (<0.05), this indicated the data was not distributed normally. The data was then analyzed through the Wilcoxon test below,

Tabel 9. Wilcoxon Test of Reading Comprehension: Pretest vs. Posttest Scores

	Posttest-Pretest
Z	-4,353
Asymp. Sig. (2-tailed)	<0,001

The data above indicated that the majority of students experienced an increase in posttest scores compared to pretest scores, as shown by 24 students getting bigger posttest scores than pretest scores. The data also indicate a positive trend in learning outcomes after the implementation of the digital literacy-based learning model (p = <0.001). In addition, this result was reinforced by the result of effect size (Cohen, 1988) as follows:

$$r = \frac{Z}{\sqrt{N}} = \frac{4{,}353}{\sqrt{25}} = 0{,}871$$

*r = effect size

Z = Wilcoxon Z Statistic

N = Number of Participants

According to Cohen (1988), r > 0,50 indicating large effect. This can be concluded from r = 0,871, indicating a large effect of the digital literacy-based learning model on students' reading comprehension.

4. Students' Perception of the learning model

The findings from the student perception questionnaire revealed generally positive responses toward the implementation of the model.

Tabel 10. The descriptive statistics of each item in the questionnaire

ITEM	**N**	**Minimum**	**Maximum**	**Mean**	**Category**
Item 1	25	1	5	3,80	High
Item 2	25	2	5	4,28	Very High

Item 3	25	3	5	4,24	Very High
Item 4	25	3	5	4,52	Very High
Item 5	25	3	5	4,64	Very High
Item 6	25	2	5	4,04	High
Item 7	25	2	5	4,12	High
Item 8	25	3	5	4,20	High
Item 9	25	2	5	4,32	Very High
Item 10	25	1	5	4,44	Very High
Item 11	25	2	5	3,44	High
Item 12	25	3	5	4,48	Very High
Item 13	25	1	5	3,64	High
Item 14	25	2	5	3,76	High
Item 15	25	3	5	3,92	High
Item 16	25	2	5	3,76	High
Item 17	25	3	5	4,28	Very High
Item 18	25	3	5	3,84	High
Item 19	25	3	5	4,16	High
Item 20	25	2	5	3,96	High
Mean Total				4,09	

Table 11. Questionnaire rubric and interval adapted from Li (2023)

Mean score	Category	Interpretation
4.21 – 5.00	Very High	Strongly agree
3.41 – 4.20	High	Agree
2.61 – 3.40	Medium	Neutral
1.81 – 2.60	Low	Disagree
1.00 – 1.80	Very Low	Strongly disagree

$$Interval = \frac{Highest\ Score - 1}{Highest\ Score} = \frac{5-1}{5} = 0.80$$

The highest mean scores were found in items related to the use of visual and digital media, indicating that students perceived these elements as helpful in understanding the learning material. However, lower scores were found in items related to students' confidence in expressing opinions, suggesting that affective aspects may require further instructional support. Overall, the model was considered attractive and engaging by the students. Additionally, this result was supported by the *Cronbach's Alpha* value as follows:

Tabel 12. Cronbach's Alpha value of Students' Questionnaire

	Reliability Statistics
Cronbach's Alpha	0,89
Number of items	20

The reliability of the 20-item multiple-choice test was examined using Cronbach's Alpha in SPSS. The analysis yielded a Cronbach's Alpha coefficient of 0.895, indicating a high level

of internal consistency among the test items. This coefficient fell within the good reliability category.

Discussion

1. The process of developing a digital literacy-based learning model

This study developed a digital literacy-based learning model through a structured ten-stage R&D process, reflecting a clear progression from needs identification to practical implementation. The process began with a needs analysis, which revealed students' challenges in reading comprehension and their preference for digital media, emphasizing the need to integrate digital literacy into instruction. In the planning phase, instructional goals were defined, and suitable digital tools were selected. The initial product, comprising lesson plans, teaching materials, and worksheets incorporating problem-based learning and digital literacy, was then created, validated by experts, and considered highly feasible. This iterative process reflects the importance of aligning instructional design with contextual learning needs, as emphasized in development research (Borg & Gall, 1983). The designed model incorporated digital tools, problem-based learning strategies, and structured tasks aimed at promoting critical thinking and reading comprehension. The needs analysis revealed that students had difficulties understanding English texts and preferred digital learning media. This aligns with previous studies indicating that EFL learners benefit from technology-supported environments that enhance engagement and accessibility (Falloon, 2020; Tinmaz et al., 2022). The incorporation of digital tools, including YouTube, Canva, and interactive quizzes, aligns with contemporary trends in digital literacy integration within language learning, supported by the findings of Marin & Castaneda (2023). The findings suggest that the implementation of the Digital Literacy-Based Learning Model was associated with improvements in students' critical thinking skills and reading comprehension. However, because the study employed a one-group pretest-posttest design, these findings should be interpreted cautiously and require further confirmation through studies employing more rigorous experimental designs.

2. The effect of the developed model on students' critical thinking skills

The significant improvement of students' critical thinking skills confirmed that integrating digital literacy into EFL instruction can effectively promote higher-order thinking. This was evidenced by the results of statistical data, which showed a significant difference between pretest and posttest results, indicating that students' performance improved after the implementation of the learning model. The multimodal texts, technology-based learning tools, and problem-based activities encouraged students to engage in essential critical thinking processes. These activities required students not only to understand information but also to assess its credibility, particularly through the inclusion of Digital Information Verification (DIV) as a key component of the developed model. The result was consistent with previous studies that emphasize the importance of integrating critical thinking into language learning to enhance cognitive development. As proposed by Peter A. Facione et al. (2020), critical thinking aspects were essential competencies that support learners' academic success and future readiness. In addition, the integration of structured and interactive activities aligned with the perspective that meaningful engagement and guided inquiry were necessary to foster higher-order thinking in EFL contexts (Li, 2023; Richards, 2017). The theoretical contribution of DIV lies in repositioning digital literacy from an information-access skill to an evidence-based cognitive verification process that systematically activates the core dimensions of critical thinking during reading comprehension.

Furthermore, the improvement in students' critical thinking skills is also supported by their positive perceptions of the learning model, as reflected in the questionnaire results, where most items were categorized as high to very high. This suggests that students are not only cognitively engaged but also positively motivated to participate in learning activities that require deeper thinking. Therefore, the findings indicate that the integration of digital literacy into EFL instruction provides an effective pedagogical approach to developing students' critical thinking skills, while simultaneously enhancing their engagement and learning experience.

3. The effect of the developed model on students' reading comprehension

The findings revealed that the developed model had a positive impact on students' reading comprehension. Comparison between pretest and posttest results indicates after the implementation of the digital literacy-based learning model. Based on the data, most students showed higher scores in the posttest across all reading components, including identifying main ideas, understanding vocabulary, recognizing supporting details, and analyzing text structure. While the pretest results indicated that many students struggled to answer correctly (frequent incorrect responses across items), the posttest results revealed a noticeable shift, with the majority of students giving correct answers more consistently. This indicates that students were able to process and comprehend texts more effectively after being exposed to the learning model. The improvement in reading comprehension suggests that the use of digital literacy elements, such as visual supports and interactive media, facilitates a deeper understanding of texts. Students were able to process information more effectively due to the availability of multimodal input and structured learning tasks. This supports the view that digital environments enhance reading comprehension by providing richer and more engaging learning experiences (Li, 2023; Richards, 2017; Tinmaz et al., 2022). Furthermore, the results aligned with the theory that multimodal input plays a crucial role in helping learners interpret and integrate information more effectively, particularly in EFL contexts where language exposure is limited. The combination of text, visuals, and interactive activities enabled students to better grasp meaning, make inferences, and connect ideas within the text. This is consistent with previous research emphasizing that meaningful interaction and structured instructional support are essential for improving reading comprehension in EFL learning (Richards, 2017).

4. Students' Perception of the learning model

The descriptive statistics of the students' questionnaire revealed that all 25 respondents completed the instrument without missing data, ensuring the reliability of the dataset. The mean scores of the 20 items ranged from 3.44 to 4.64, with the majority of items falling into the high and very high categories. The highest mean score was observed in item Q5 (M = 4.64), which reflects students' strong agreement on the effectiveness of multimodal digital scaffolding in enhancing reading comprehension. In contrast, the lowest mean score was found in item Q11 (M = 3.44), which relates to students' confidence in expressing opinions, suggesting that affective aspects of learning may require further instructional support. The overall average score of approximately 4.09 indicates a high level of positive student perception toward the digital literacy–based learning model.

Additionally, the findings provide empirical evidence that the integration of digital literacy elements creates an engaging and supportive learning environment. The high appreciation for visual and multimodal scaffolding aligns with the view that digital learning environments enhance comprehension by enabling learners to process and integrate information through

multiple modes. The use of interactive digital tools contributes to increased student engagement and learning effectiveness, as digital literacy facilitates active involvement and meaningful learning experiences (Tinmaz et al., 2022). Furthermore, the overall positive perception supports the principle that effective EFL instruction should provide meaningful exposure and interactive learning opportunities to promote student engagement (Richards, 2017). However, the relatively lower score on students' confidence in expressing opinions indicates that while cognitive engagement was successfully enhanced, affective and communicative aspects require additional pedagogical attention. This finding is consistent with the argument that developing higher-order thinking and self-expression requires sustained practice and guided interaction (Li, 2023). Therefore, incorporating more structured speaking activities and collaborative discussions may further strengthen students' confidence and participation.

D. CONCLUSION

Based on the results and subsequent analysis, it is evident that the implementation of the Digital Literacy-Based Learning Model significantly improved students' critical thinking skills and reading comprehension in EFL junior high school context. The comparison of pretest and posttest scores demonstrated a meaningful enhancement in students' performance after the intervention, indicating the effectiveness of the developed model in supporting learning outcomes. In addition to cognitive gains, students expressed generally favorable perceptions of the learning experience. The integration of multimodal digital resources, including visual images as knowledge support, suggests that visual-based digital input effectively facilitates the understanding of English materials. However, lower mean scores on items related to students' confidence in expressing opinions indicate that affective aspects may require longer intervention and more structured speaking activities. Overall, the integration of digital literacy elements, such as multimodal texts, visual supports, guided inquiry tasks, and critical questioning strategies, proved effective in promoting deeper comprehension and higher-order thinking, supporting the view that digital literacy-oriented instruction enhances active meaning-making and critical engagement in EFL learning. The findings suggest that the implementation of the Digital Literacy-Based Learning Model was associated with improvements in students' critical thinking skills and reading comprehension. However, because the study employed a one-group pretest-posttest design, these findings should be interpreted cautiously and require further confirmation through studies employing more rigorous experimental designs.

As a recommendation, the integration of digital literacy-based learning should be strengthened through collaborative efforts among teachers, schools, and future researchers. English teachers are encouraged to systematically incorporate digital literacy components, such as visual scaffolding, multimodal texts, and critical questioning, into reading instruction while also providing structured activities to enhance students' critical thinking. Schools and educational stakeholders should support this implementation by providing adequate digital infrastructure and continuous professional development programs focused on innovative, technology-integrated pedagogy. Furthermore, future researchers are advised to extend this work through broader contexts or other English language skills studies to examine the long-term impact and wider applicability of digital literacy-based learning across different educational levels and learning domains.

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