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# Digital Text-Based Learning as an Innovative Approach to Enhancing Critical Reading Literacy in Higher Education

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**ABSTRACT** In the twenty-first century, cultivating critical reading literacy is essential for university students navigating complex digital information. This study investigates the impact of Digital Text-Based Learning (DTBL) on advancing undergraduate students' critical reading proficiencies. Employing a pre-experimental one-group pre-test and post-test design, the research involved twenty-five students in an eight-week structured digital intervention. Data derived from measuring five distinct cognitive indicators were analyzed through paired sample testing and effect size calculations. The findings reveal a statistically significant enhancement in analytical capabilities, generating a remarkably large effect size. Interactive digital tools, such as collaborative annotations and lateral reading, successfully shifted habits from passive to active reading. The most growth occurred in identifying main ideas and evaluating arguments. While formulating evidence-based responses grew, it remained challenging primarily due to academic vocabulary constraints. Ultimately, integrating dynamic digital texts with explicit pedagogical frameworks successfully empowers students to critically evaluate modern information landscapes.

**KEYWORDS**
Critical Reading Literacy;
Digital Text-Based Learning;
EFL Students, Higher Education;
Digital Literacy;
Reading Comprehension.

**ABSTRAK** Di abad ke-21, pengembangan literasi membaca kritis sangat penting bagi mahasiswa untuk menavigasi informasi digital yang kompleks. Penelitian ini mengkaji dampak *Digital Text-Based Learning* (DTBL) terhadap peningkatan kemampuan literasi membaca kritis mahasiswa. Dengan menggunakan desain pra-eksperimental *one-group pre-test and post-test*, penelitian ini melibatkan 25 mahasiswa dalam intervensi digital terstruktur selama delapan minggu. Data yang diperoleh dari pengukuran lima indikator kognitif dianalisis melalui pengujian sampel berpasangan (*paired sample test*) dan perhitungan ukuran efek (*effect size*). Temuan penelitian menunjukkan peningkatan kemampuan analitis yang signifikan secara statistik, serta menghasilkan ukuran efek yang sangat besar. Fitur digital interaktif, seperti anotasi kolaboratif dan membaca lateral, berhasil mengubah kebiasaan membaca mahasiswa dari pasif menjadi aktif. Peningkatan terbesar terjadi pada kemampuan mengidentifikasi ide pokok dan mengevaluasi argumen. Meskipun kemampuan menyusun respons berbasis bukti juga meningkat, hal ini tetap menjadi tantangan terutama karena kendala penguasaan kosakata akademik. Pada akhirnya, integrasi teks digital yang dinamis dengan kerangka pedagogis eksplisit berhasil memberdayakan mahasiswa untuk mengevaluasi lanskap informasi modern secara kritis.

**KATAKUNCI**
Literasi Membaca Kritis;
Pembelajaran Berbasis Teks Digital;
Mahasiswa EFL;
Literasi Digital;
Pemahaman Membaca.

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## 1. Introduction

In the twenty-first century, the higher education landscape necessitates a profound paradigm shift in how reading skills are conceptualized and taught. Literacy in current academic settings transcends basic decoding, emerging instead as a complex socio-cognitive competency known as critical reading literacy (Snow & Moje, 2019). This advanced literacy equips students to move past superficial understanding, urging them to actively scrutinize, assess, and contemplate intricate texts within their wider socio-cultural environments. Grounded in critical pedagogy, this perspective maintains that education should act as a transformative force, shifting from the simple delivery of facts to the nurturing of critical consciousness (Freire, 1970). Consequently, the act of reading is viewed not just as deciphering words on a page, but as a rigorous involvement in interpreting the world by questioning prevailing realities (Freire, 1970). Educational theories further highlight that learning must be an active, social endeavor that continuously evolves to meet societal shifts and promote democratic engagement among learners (Dewey, 2004). Thus, critical reading literacy stands as an essential skill for university students, providing them with the tools to dismantle ideological frameworks, negotiate contemporary complexities, and arrive at evidence-based academic conclusions (Janks, 2021).

An examination of contemporary literature emphasizes the vital intersection between advanced reading capabilities and the swiftly changing digital environment that defines modern knowledge societies. The rapid expansion of digital media has unleashed vast amounts of information with highly variable credibility, accuracy, and hidden motives, which inherently complicates the reading experience. Researchers contend that achieving critical literacy in this epoch demands strong navigational and evaluative skills to proficiently handle hyperlinked, interactive, and multimodal information spaces (Leu et al., 2022). Literature also insists that readers need to adopt an active, interrogative posture to challenge the pervasive social representations and power structures embedded in digital texts (Cervetti, Pardales, & Damico, 2020). This proactive approach necessitates the synthesis of cognitive and metacognitive faculties, driving students to persistently regulate their understanding, apply specific reading tactics, and correct misinterpretations while engaging with online materials (Mokhtari & Reichard, 2002). To thrive in such an environment, academic institutions are compelled to merge digital literacy with critical reading, ensuring learners have the technical and analytical expertise required to filter out misinformation, detect biases, and ethically generate knowledge in virtual arenas (Liu, 2021; Ng, 2022).

Notwithstanding the clear academic necessity for critical literacy, its practical execution in higher education—especially within English as a Foreign Language (EFL) settings—uncovers significant pedagogical and cognitive gaps. Initial observations in

the English Language Education Department at Universitas Negeri Gorontalo reveal that the critical reading skills of students are alarmingly deficient. A dominant instructional problem is the deeply ingrained habit among students to engage solely in surface-level reading, a method where they interact with texts merely to extract literal facts or find quick answers without conducting any deeper evaluation. As a result, these learners miss the overarching arguments, fail to recognize the logical frameworks linking concepts, and overlook the socio-ideological backgrounds influencing the text. This mechanical reading approach exposes severe vulnerabilities across crucial cognitive and metacognitive areas, including the ability to gauge an author's purpose, verify the soundness of evidence, and interrogate the neutrality of the presented data (Wallace, 2003). Furthermore, this passive absorption of content sharply contradicts the higher-order cognitive demands of university-level academia, which necessitate deliberate interpretation, critical appraisal, and evidence-driven reasoning (Facione, 2015).

To methodically resolve these instructional deficits, an extensive reconstruction of reading pedagogy is critically needed. This overhaul must go beyond surface-level syllabus tweaks and trigger a foundational shift in the reading paradigm, redirecting the educational emphasis from the passive transmission of knowledge to an engaged, conversational, and reflective learning experience. Theoretical frameworks propose dismantling the archaic banking model of education, which treats learners as passive receivers, in favor of problem-posing strategies that foster ongoing analytical dialogue and critical awareness (Freire, 2018). Aligning with cognitive development theories, reading tasks must be upgraded from foundational memorization and comprehension to the sophisticated levels of analysis, evaluation, and creation (Anderson & Krathwohl, 2001). This pedagogical transformation is particularly vital for EFL students, as they are required to interact with intricate, multimodal international academic literature to construct their linguistic and professional proficiencies (Martin-Beltrán et al., 2017). Consequently, the intended reconstruction seeks to reshape the learning atmosphere, ensuring that teaching methods deliberately cultivate students' capacities to assess arguments empirically and formulate new insights logically.

Within the domain of targeted instructional interventions, academic literature increasingly highlights Digital Text-Based Learning (DTBL) as a robust and highly pertinent solution for nurturing critical reading literacy. DTBL constitutes an updated pedagogical strategy derived from Text-Based Learning, positioning digital texts as the core medium of language instruction and broadening the educational landscape through electronic books, virtual journals, and interactive digital flipbooks. Prior studies indicate that DTBL supplies a vibrant learning ecosystem that substantially boosts students' analytical routines via features such as digital annotations, shared highlighting, and interactive hyperlinking (Warschauer, 2021). Nevertheless, the effective deployment of

this technology demands a solid instructional blueprint that seamlessly blends digital tools with suitable content and pedagogical methods, guaranteeing that the technological medium proactively aids cognitive growth rather than serving as a hindrance (Mishra & Koehler, 2006). By adeptly applying DTBL, learners are systematically prompted to utilize sophisticated online reading strategies, empowering them to search, identify, and critically amalgamate data across diverse digital platforms (Coiro & Dobler, 2019).

The distinct mechanisms embedded within DTBL offer precise remedies for the deficiencies noted in traditional reading education. By interacting with dynamic digital platforms, learners shift from sequential, print-oriented reading to lateral reading techniques, which empower them to cross-examine claims and authenticate source reliability instantaneously. Moreover, incorporating both asynchronous and synchronous online discussion boards into the DTBL structure promotes rigorous peer-to-peer collaborative learning. This interactive setting enables students to debate meanings, question different viewpoints, and collectively build knowledge, thereby honing their ability to construct critical responses grounded in evidence (Jiang & Wang, 2024). DTBL additionally reinforces metacognitive consciousness, as learners deploy digital instruments to monitor their comprehension, amend interpretative mistakes, and map out complex arguments. Through these customized digital strategies, students are directed to engage profoundly with reading materials, transcending the basic roles of code-breakers and text participants to emerge as adept text users and analysts equipped to untangle the power dynamics and ideological prejudices present in academic texts (Luke & Freebody, 1999).

A thorough evaluation of pertinent literature unveils a complex understanding of how digital literacy impacts education, while simultaneously exposing a glaring research gap that demands empirical scrutiny. Recent systematic reviews have deduced that although critical reading is acknowledged as essential in higher education, its pedagogical execution is mostly unstructured and infrequently bolstered by cohesive digital technology frameworks (Li & Wan, 2022). Correlational investigations have confirmed that while a positive relationship exists between digital literacy and critical reading comprehension, possessing digital skills alone does not spontaneously generate critical analytical competencies absent explicit instructional guidance (Mustaqaf, 2025; Prasastiningtyas, Widyapuri, & Yulianti, 2024). Additionally, whereas broader educational studies indicate that digital literacy initiatives markedly improve overall academic achievement and critical thinking across various schooling levels (Sappaile, 2025; Zakir et al., 2025), there continues to be a pronounced lack of empirical studies that methodically integrate DTBL with a specifically delineated set of critical reading metrics. In particular, the existing literature fails to supply a rigorous, empirically validated

model that revamps reading instruction by coupling digital text engagements with the precise cognitive requirements of academic critical reading within an Indonesian EFL higher education setting.

To bridge this substantial gap, the present study is deliberately structured to address the primary research question: How does the application of Digital Text-Based Learning (DTBL) impact the advancement of students' critical reading literacy in a Reading course?. The main goal of this research is to supply empirical data and validate the hypothesis that a methodically implemented DTBL intervention significantly enhances students' advanced analytical skills. The unique contribution of this research is found in its organized pedagogical reconstruction, which explicitly puts DTBL into practice across five core critical reading indicators: locating main ideas and supporting details, separating facts from opinions, scrutinizing arguments and evidence, identifying biases or ideologies, and crafting evidence-based critical replies. These indicators are strictly anchored in a theoretical synthesis of the Four Resources Model (Luke & Freebody, 1999), frameworks for evaluating critical thinking (Ennis, 1993; Paul & Elder, 2002), and critical literacy methodologies (Lewison, Flint, & Van Sluys, 2002). The scope of this inquiry is concentrated solely on undergraduate learners enrolled in the Reading for Professional Context course at Universitas Negeri Gorontalo, with the objective of generating a deeply contextualized, interactive, and theoretically robust digital reading pedagogy that fulfills the stringent requirements of twenty-first-century learning.

## 2. Method

### 2.1 Research Time and Location

The research was conducted over a period of four months, spanning from February to May 2026, at the English Language Education Department, Faculty of Literature and Culture, Universitas Negeri Gorontalo. The research timeline was meticulously structured to strictly evaluate the influence of the digital intervention. The preparatory phase, which included the design of the quantitative instruments and extensive coordination with the teaching faculty, occurred in February 2026. The quantitative implementation phase spanned February and March 2026, commencing with a pre-test to establish a solid baseline of the students' critical reading literacy. This initial assessment was immediately followed by the systematic application of the Digital Text-Based Learning intervention across eight structured instructional meetings. Upon concluding these sessions, a post-test was administered, and subsequent quantitative data analysis was conducted to measure the developmental impact.

### 2.2 Research Method and Design

This study employed a pre-experimental approach using a one-group pre-test and post-test design (Campbell & Stanley, 1963) to evaluate the effect of Digital Text-Based Learning (DTBL) as the independent variable on the improvement of students' critical reading literacy as the dependent variable. The research population comprised 125 English Language Education students enrolled in the *Reading for Professional Context* course, selected because they had already mastered basic reading skills (Suriani et al., 2023). From this population, 25 students were chosen as the sample through purposive sampling—a size deemed adequate for statistical analysis (Besekar et al., 2024)—taking into account their digital access availability and full participation across eight meetings. Quantitative data was collected using a multiple-choice critical reading literacy test instrument based on five primary indicators (Ennis, 1993; Lewison et al., 2002; Luke & Freebody, 1999; Paul & Elder, 2002), which had undergone expert validation (Creswell & Creswell, 2018; Fraenkel, Wallen, & Hyun, 2019). Through empirical testing utilizing Pearson correlation (Anastasi & Urbina, 1997; Arikunto, 2021; Slamet & Wahyuningsih, 2022), the instrument yielded 30 valid test items and demonstrated a very high level of reliability with a Cronbach's Alpha value of 0.8425 (Arikunto, 2019; Zulkifli, 2014). Finally, the data were analyzed sequentially, beginning with the Shapiro-Wilk normality test (Meng & Jiang, 2023), followed by a paired sample t-test to determine statistical significance (Khusni et al., 2024), and concluding with the calculation of Cohen's d effect size (Cohen, 1988; Diener, 2010) to measure the practical magnitude of the intervention's impact.

## 3. Results and Discussion

This section systematically presents the empirical findings aimed at answering the primary research question regarding the influence of Digital Text-Based Learning (DTBL) on developing students' critical reading literacy. The quantitative data, derived from a pre-experimental one-group pre-test and post-test design, provides a robust statistical foundation to evaluate the cognitive trajectory of the twenty-five participating undergraduate students. By integrating these numerical findings with established educational frameworks, this section illuminates how targeted digital pedagogical interventions facilitate the transition from surface-level comprehension to advanced analytical reading. The results are sequentially organized to mirror the research workflow, beginning with the initial baseline assessment, followed by a detailed account of the instructional treatment, the subsequent post-intervention outcomes, the necessary statistical prerequisite tests, and concluding with the definitive hypothesis testing and effect size computations.

### 3.1. Pre-Test Results

The initial phase of the quantitative analysis involved determining the students' baseline critical reading literacy prior to the implementation of the digital intervention. The frequency distribution of the pre-test scores revealed a concerning trend predominantly skewed towards the lower echelons of academic proficiency. Specifically, the data indicated that the largest proportion of the cohort, comprising forty-eight percent or twelve students, fell into the medium category. Furthermore, twenty-four percent of the students were classified in the low category, while twelve percent languished in the very low category. Only a marginal fraction of the sample demonstrated advanced capabilities, with twelve percent in the high category and a mere four percent achieving a very high classification. Consequently, an overwhelming eighty-four percent of the participants initially possessed critical reading skills below the high-proficiency threshold, yielding an overall mean score of 47.8. This initial diagnostic vividly underscores the prevalent pedagogical challenge wherein students heavily rely on surface reading strategies, approaching academic texts passively rather than actively interrogating the underlying sociopolitical and rhetorical dimensions, a vulnerability frequently highlighted in contemporary critical literacy literature. Table 1 presents the detailed frequency distribution of the pre-test results

**Table 1. Frequency Distribution of Pre-Test Results**

| Category | Score Interval | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Very Low | 0–20 | 3 | 12% |
| Low | 21–40 | 6 | 24% |
| Medium | 41–60 | 12 | 48% |
| High | 61–80 | 3 | 12% |
| Very High | 81–100 | 1 | 4% |
| Total | | 25 | 100% |

A more granular analysis of the pre-test performance across the five targeted indicators of critical reading literacy further illuminates these baseline deficiencies. The highest initial proficiency was paradoxically observed in the indicator concerning the detection of bias, ideology, or interests within texts, where students achieved a percentage of 72.8. Conversely, the most profound weakness manifested in the students' ability to formulate evidence-based critical responses, which recorded a critically low achievement rate of 39.2 percent. The remaining indicators demonstrated mediocre performance, with the identification of main ideas and supporting information at 47.4 percent, the distinction between facts and opinions at 48.0 percent, and the analysis of arguments and evidence

at 51.0 percent. This specific pattern of cognitive struggle strongly aligns with the theoretical assertions of Luke and Freebody (1999) regarding the Four Resources Model, suggesting that while students may possess rudimentary sensitivities to textual subjectivity, they critically lack the linguistic and analytical scaffolding required to systematically construct independent, logically sound arguments and effectively participate as autonomous text analysts. Table 2 details the precise achievement in each specific indicator during the pre-test.

**Table 2. Students' Achievement per Indicator in Pre-Test**

| Critical Reading Literacy Indicator | Total Point | Maximum Score | Percentage |
|---|---|---|---|
| Identifying main ideas and supporting information | 83 | 175 | 47.4% |
| Distinguishing facts and opinions | 60 | 125 | 48.0% |
| Analyzing arguments and evidence | 102 | 200 | 51.0% |
| Detecting bias, ideology, or interests in the text | 65 | 125 | 72.8% |
| Formulating evidence-based critical responses | 49 | 125 | 39.2% |

### 3.2. Treatment

To systematically address the cognitive and metacognitive deficits identified in the pre-test, a rigorously structured Digital Text-Based Learning intervention was executed over an eight-meeting period. Following the initial pre-test in the first meeting, the subsequent six sessions were exclusively dedicated to intensive digital instructional treatments focusing on diverse academic text genres. During the second and third meetings, students engaged with descriptive, report, recount, and narrative texts utilizing interactive digital flipbooks. In these sessions, the instructional design deliberately operationalized the principles of meaning-making by requiring students to utilize digital search and highlighting tools to efficiently isolate main ideas and chronological structures, thereby reducing the cognitive load typically associated with dense academic reading. The fourth and fifth meetings advanced the cognitive complexity by introducing procedure, explanation, and argumentative texts. Here, the intervention heavily leaned on digital argument mapping and lateral reading strategies, compelling students to visually deconstruct thesis statements, evaluate the logical coherence of presented evidence, and cross-reference claims against external digital databases, practices strongly advocated by Ennis (1993) and Paul and Elder (2002) for cultivating robust critical thinking. The final phase of the treatment, encompassing the sixth and seventh meetings, immersed students in discussion, review, spoof, and anecdote texts. This advanced stage required students to utilize collaborative digital annotation and online

forum threads to actively debate authorial biases, uncover hidden ideological framings, and ultimately synthesize their findings into formally structured, evidence-based critical responses. This comprehensive pedagogical orchestration seamlessly integrated technology, pedagogy, and content knowledge, actualizing the TPACK framework (Mishra & Koehler, 2006) to transform passive readers into critically engaged digital scholars. The eighth meeting concluded the sequence with the administration of the post-test.

### 3.3. Post-Test Results

Following the culmination of the digital intervention, the post-test results exhibited a profound and statistically observable paradigm shift in the students' critical reading proficiencies. The frequency distribution underwent a dramatic positive inversion, where the most dominant grouping shifted remarkably to the very high category, encompassing thirty-six percent of the cohort, or nine students. This was followed by the medium category at twenty-four percent, the high category at twenty percent, the low category at sixteen percent, and the very low category shrinking to a mere four percent. Cumulatively, fifty-six percent of the students successfully ascended to the high and very high proficiency echelons, a stark contrast to the pre-intervention landscape where eighty-four percent of the participants resided below these levels. Consequently, the overall mean score surged impressively from 47.8 to 68.8. This substantial upward trajectory validates the theoretical premise that critical reading is not an innate trait but a highly teachable cognitive competency that can be significantly accelerated through explicit, technology-enhanced pedagogical scaffolding. Table 3 details the comprehensive frequency distribution of the post-test results.

**Table 3. Frequency Distribution of Post-Test Results**

| Category | Score Interval | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Very Low | 0–20 | 1 | 4% |
| Low | 21–40 | 4 | 16% |
| Medium | 41–60 | 6 | 24% |
| High | 61–80 | 5 | 20% |
| Very High | 81–100 | 9 | 36% |
| Total | | 25 | 100% |

The transformative impact of the digital intervention becomes even more evident when analyzing the post-test achievements across the specific critical reading indicators. The most monumental growth was recorded in the foundational skill of identifying main ideas and supporting information, which skyrocketed by 27.46 percentage points, moving from 47.4 percent to an impressive 74.86 percent. This validates the efficacy of targeted digital highlighting and annotation tools in streamlining cognitive processing and enhancing textual comprehension. Furthermore, the indicator measuring the ability to formulate evidence-based critical responses witnessed a massive 24.0 percentage point increase, elevating from 39.2 percent to 63.2 percent. Similarly, the capacity to distinguish facts from opinions rose by 22.4 percentage points to reach 70.4 percent, while the analysis of arguments and evidence increased by 14.5 percentage points to 65.5 percent. Interestingly, the sole indicator to experience a minor retraction was the detection of bias, ideology, or interests, which decreased slightly by 3.2 percentage points from 72.8 percent to 69.6 percent. This minor statistical anomaly can be attributed to the phenomenon of regression to the mean, given its exceptionally high initial baseline, or it may reflect a heightened difficulty level in the specific post-test items related to this construct (Lewison et al., 2002). Nevertheless, the overarching pattern incontrovertibly demonstrates that Digital Text-Based Learning powerfully enhances the multifaceted dimensions of critical literacy, seamlessly bridging the gap between digital navigation and rigorous academic analysis. Table 4 provides the exact numerical breakdown of students' achievement across each critical reading indicator during the post-test.

**Table 4. Students' Achievement per Indicator in Post-Test**

| Critical Reading Literacy Indicator | Total Point | Maximum Score | Percentage |
|---|---|---|---|
| Identifying main ideas and supporting information | 131 | 175 | 74.86% |
| Distinguishing facts and opinions | 88 | 125 | 70.40% |
| Analyzing arguments and evidence | 131 | 200 | 65.50% |
| Detecting bias, ideology, or interests in the text | 87 | 125 | 69.60% |
| Formulating evidence-based critical responses | 79 | 125 | 63.20% |

### 3.4. Data Normality Test

To ensure the methodological integrity of the subsequent inferential statistical analyses, it was imperative to ascertain the distributional characteristics of the empirical data. Because the research sample consisted of exactly twenty-five participants, the Shapiro-Wilk test was judiciously selected as the most appropriate metric for evaluating data normality, adhering strictly to established psychometric guidelines (Meng & Jiang, 2023). The statistical computation yielded a significance value of 0.426 for the pre-test data and a significance value of 0.223 for the post-test data. Given that both of these significance values comfortably exceed the stringent alpha threshold of 0.05, it confirms that the scores from both the pre-test and the post-test are normally distributed across the participating cohort. The establishment of this normal distribution is a critical methodological prerequisite, as it unequivocally validates and authorizes the utilization of parametric statistical procedures, specifically the paired sample t-test, for the ensuing hypothesis testing phase. The precise numerical outputs of this normality test are thoroughly documented in Table 5.

**Table 5. Results of the Data Normality Test using Shapiro-Wilk**

| Data Source | Statistic | Degrees of Freedom (df) | Significance (Sig.) |
|---|---|---|---|
| Pre-test | 0.961 | 25 | 0.426 |
| Post-test | 0.948 | 25 | 0.223 |

### 3.5. Paired Sample t-Test

With the parametric assumptions thoroughly satisfied, the research proceeded to the core inferential hypothesis testing utilizing the paired sample t-test to evaluate the statistical significance of the score differentials within the single cohort before and after the digital intervention. The null hypothesis posited that there would be no significant difference in the students' critical reading literacy scores, whereas the alternative hypothesis asserted that a significant improvement would manifest following the application of the Digital Text-Based Learning methodology. The test generated a mean paired difference of -20.960, indicating an absolute average score increase of nearly twenty-one points per student. Furthermore, the computed t-value stood at -12.298 with twenty-four degrees of freedom. Most decisively, the two-tailed significance value was calculated to be less than 0.001. Because this p-value is substantially lower than the predetermined 0.05 significance level, the null hypothesis is unequivocally rejected, leading to the definitive acceptance of the alternative hypothesis. This provides irrefutable statistical evidence that the integration of Digital Text-Based Learning exerts a profound and statistically significant positive influence on the development of students'

critical reading literacy capabilities. The comprehensive statistical data encompassing the mean differences, standard deviations, and significance levels derived from this paired sample t-test are systematically recorded in Table 6.

**Table 6. Results of the Data Normality Test using Shapiro-Wilk**

| Pair 1 (Pretest - Posttest) | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|
| Paired Differences | -20.960 | 8.522 | 1.704 | -24.478 | -17.442 | -12.298 | 24 | < .001 |

## 3.6. Effect Size Analysis

While the paired sample t-test successfully established the statistical significance of the intervention, an effect size analysis was subsequently conducted to quantify the practical magnitude and substantive educational meaningfulness of this improvement. Relying solely on statistical probability can sometimes obscure the true pedagogical impact of an instructional method; therefore, calculating the effect size utilizing Cohen's d formula is vital for interpreting the real-world efficacy of the digital treatment (Diener, 2010). The results of this analysis reveal a Cohen's d value of 2.460. According to the universally recognized classification parameters established by Cohen (1988), any value surpassing the 0.80 threshold signifies a large effect. Consequently, the absolute value obtained (2.460) falls into the category of a very large effect, demonstrating that the Digital Text-Based Learning intervention did not merely produce a marginal improvement, but rather triggered a massive, highly substantive transformation in the students' cognitive reading competencies. The ninety-five percent confidence interval, ranging from -3.248 to -1.658, further solidifies the reliability of this massive effect across broader potential applications. The specific metrics utilized for this effect size analysis, including the precise Cohen's d value, are comprehensively detailed in Table 7.

**Table 7. Results of the Effect Size Analysis (Cohen's d)**

| Metric (Pretest - Posttest) | Standardizer | Point Estimate (Cohen's d) | 95% Confidence Interval (Lower) | 95% Confidence Interval (Upper) |
|---|---|---|---|---|
| Paired Samples Effect Size | 8.522 | -2.460 | -3.248 | -1.658 |

## 3.7 Discussion

### 3.7.1. The Transformative Influence of Digital Text-Based Learning

The empirical findings of this study provide compelling evidence that the systematic implementation of Digital Text-Based Learning (DTBL) profoundly enhances the critical reading literacy of undergraduate students. The rejection of the null hypothesis, supported by a highly significant paired sample t-test and an exceptionally large Cohen's d effect size, confirms that critical reading is not a static, innate trait but a dynamic cognitive competency that can be significantly accelerated through deliberate pedagogical intervention. This finding is particularly crucial within the context of English as a Foreign Language (EFL) instruction in higher education, where students traditionally struggle to move beyond surface-level literal comprehension. While prior correlational research by Mustaqaf (2025) indicated a positive relationship between general digital literacy and reading comprehension, the present study advances this discourse by proving that unguided exposure to digital environments is insufficient; rather, it is the explicit, structured integration of digital pedagogical strategies that acts as the catalyst for elevated critical thinking. This aligns directly with the assertions of Prasastiningtyas, Widyapuri, and Yulianti (2024), who emphasized the absolute necessity of explicit digital pedagogical frameworks to unlock students' analytical potential. Furthermore, by providing a rigorously tested instructional model, this research effectively bridges the significant gap identified by Li and Wan (2022), who previously noted that critical reading instruction in higher education remained largely unsystematic and detached from modern technological advancements. The success of this intervention ultimately underscores the validity of the Technological Pedagogical Content Knowledge (TPACK) framework proposed by Mishra and Koehler (2006), demonstrating that technology must be purposefully intertwined with specialized content and active pedagogy to function as an enabler of higher-order cognitive processing.

### 3.7.2 Enhancing Meaning-Making and Argumentative Analysis

A granular examination of the specific critical reading indicators reveals that DTBL exerts variable yet highly positive influences across different cognitive domains. The most monumental growth was observed in the students' ability to identify main ideas and supporting information, which serves as the foundational pillar for all subsequent critical analysis. This substantial improvement is theoretically anchored in the meaning-making principle of the Four Resources Model developed by Luke and Freebody (1999). The digital environment functionally aligned with the students' cognitive needs; interactive features such as digital highlighting and annotation significantly reduced the cognitive load typically associated with deciphering dense academic texts. As corroborated by Mason et al. (2023), the act of digital highlighting streamlines the visual filtering of crucial

information, thereby accelerating the initial stages of textual comprehension and allowing students to allocate greater cognitive resources to deeper analytical tasks. Building upon this foundational comprehension, the students demonstrated remarkable progress in their capacity to distinguish facts from opinions and to meticulously analyze arguments and evidence. These enhancements are deeply intertwined with the critical thinking paradigms established by Ennis (1993) and the evaluative frameworks of Paul and Elder (2002). The DTBL environment actively dismantled the traditional, passive reading habits of the students, compelling them to adopt an interrogative stance toward the texts. By utilizing digital tools to construct argument maps and engaging in lateral reading—where claims are immediately cross-referenced against external digital databases—students transitioned from passive consumers of information to active, skeptical text analysts. This paradigm shift demonstrates that when digital tools are utilized pedagogically, they successfully scaffold the complex cognitive processes required to evaluate the logical consistency, empirical validity, and rhetorical strength of academic arguments.

## 4. Conclusion

This study demonstrates that the systematic implementation of Digital Text-Based Learning (DTBL) serves as a powerful pedagogical catalyst, significantly elevating the critical reading literacy of EFL undergraduate students. Moving beyond surface-level comprehension, the targeted digital intervention robustly enhanced students' capacities to identify central ideas, distinguish facts from opinions, and rigorously analyze academic arguments. The integration of collaborative digital annotations and lateral reading practices effectively transformed passive readers into active, metacognitively aware text analysts. Consequently, this research enriches the existing body of knowledge by providing empirical validation that general digital literacy is insufficient on its own; rather, cultivating high-level critical thinking requires explicit, TPACK-grounded pedagogical frameworks to harness technology effectively.

While the intervention yielded a massive overall effect size, the findings also highlight critical pedagogical nuances. Formulating evidence-based critical responses remained the most challenging competency, primarily constrained by students' academic vocabulary limitations rather than cognitive deficits. Furthermore, the inherent challenges of screen fatigue and digital distractions emphasize the necessity of fostering self-regulation alongside digital skills. Ultimately, DTBL successfully reconstructs reading from an isolated, print-centric task into a dynamic, dialogic ecosystem. Future research should expand upon these findings by investigating longitudinal implementations across diverse educational levels and exploring how integrating adaptive AI tools or gamification might mitigate linguistic barriers and sustain long-term engagement. By deliberately

fusing technology with critical literacy, educators can empower students to navigate and responsibly shape the complex digital information landscape of the twenty-first century.

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