International Journal of Education and Teaching Zone. Volume 4 (Issue 2): 16-06 (2025)
DOI: https://10.57092/ijetz.v4i2.434

THE JOURNAL OF IJETZ
(International Journal of Education and Teaching Zone)
P-ISSN: 2963-7899 I E-ISSN: 2830-7925
jurnal.yayasannurulyakin.sch.id/index.php/ijetz

Enhancing Students' Inferential Reading Skills through a Higher Order Thinking Skills Based Module: An Experimental Study

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Article History:
Received: March 30, 2025
Revised: May 07, 2025
Accepted: May 27, 2025
Published: June 16, 2025

Keywords:
Bloom's revised taxonomy,
EFL Learners,
Higher-order thinking skills,
Inferential reading,
Metacognitive awareness.

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Abstract: Limited empirical research has examined how Higher-Order Thinking Skills (HOTS)-based instructional modules can enhance inferential reading among Indonesian EFL learners in Islamic higher education. Addressing this gap, this quasi-experimental study evaluated the impact of a HOTS-based module grounded in Bloom's Revised Taxonomy on students' inferential reading skills and metacognitive strategies. A total of 57 EFL learners from an Islamic university in Indonesia participated (28 experimental, 29 control) over a six-week intervention. Inferential reading performance was measured using a validated multiple-choice reading comprehension test. Data were analyzed using paired and independent samples *t*-tests with effect size estimation. The experimental group demonstrated significant improvement (mean gain = 10.89 points; $p = 0.000$; Cohen's $d = 1.22$), and a significant difference was found between groups ($p = 0.008$; Cohen's $d = 0.75$), indicating a strong practical impact. This quasi-experiment provides evidence-based support for integrating HOTS-oriented instruction to foster *21st century skills* such as critical literacy and metacognitive awareness in Indonesian EFL contexts. The findings support the integration of HOTS (Higher Order Thinking Skills) modules into teacher certification programs and EFL teacher training curricula within Islamic higher education institutions across Southeast Asia, contributing to the advancement of pedagogical practices and teacher professional development.

INTRODUCTION

Although the strategic role of higher education in shaping high-quality human resources is well recognized in Indonesia, effectively measuring and evaluating this role remains a complex challenge especially within a nation marked by cultural, economic, and social diversity. Success indicators must therefore go beyond academic achievement to include character formation, social competence, and practical readiness (Kebritchi et al., 2017; Sarwar et al., 2019; Turan, 2014). In accordance with Law No. 12/2012 on Higher Education, universities are expected to produce graduates who embody moral integrity, critical thinking, collaboration, effective communication, and digital literacy. However, recent evaluations by the World Bank (2020) and Kemdikbudristek (2022) reveal persistent gaps in these competencies, particularly in applying knowledge to real-world contexts. The alignment between higher education objectives and the dynamic needs of

industry and society in the era of Industrial Revolution 4.0 and Society 5.0 calls for continual refinement. Moreover, bridging the gap between theory and practice demands stronger collaboration between higher education institutions, government, and industry to ensure that graduates possess both conceptual understanding and practical skills (Chusni et al., 2020; McCombs, 1988). Within many Islamic higher education institutions, this challenge is further amplified by curricula that remain predominantly content-driven and insufficiently aligned with the cognitive demands of modern work environments. In particular, the integration of Higher-Order Thinking Skills (HOTS) and inferential literacy within language education remains limited (Fernando et al., 2021; Jelatu et al., 2019; Lindsey K. Le, 2013; Sofyatinigrum, 2018). Addressing this gap, the present study explores evidence-based instructional strategies aimed at strengthening inferential reading and HOTS competencies in Islamic higher education, thereby contributing to more holistic and industry-relevant graduate outcomes.

Despite the increasing emphasis on cultivating 21st-century competencies, Despite growing emphasis on 21st-century competencies, instructional practices in many Indonesian universities including Islamic higher education institutions remain predominantly teacher-cantered and focused on rote learning. As a result, opportunities for fostering critical thinking, problem-solving, and inferential reading are often limited (Defrianti & Iskandar, 2022; Meeuwisse et al., 2023). For example, reading instruction typically centers on literal comprehension rather than encouraging students to infer meaning, analyze arguments, or synthesize ideas key components of Higher-Order Thinking Skills (HOTS). This gap undermines students' ability to adapt, innovate, and solve problems in real-world contexts. Similar challenges are observed globally (Saavedra & Opfer, 2012; Brookhart, 2010), highlighting the need for targeted pedagogical interventions. Integrating HOTS-based instructional modules offers a promising pathway to better align classroom practices with curricular goals and equip graduates with the cognitive and practical skills demanded by today's workforce (Hawari & Noor, 2020; Hayes, 2015).

Higher-Order Thinking Skills (HOTS) are increasingly regarded as core competencies in contemporary education, particularly within the fields of cognitive and educational psychology. Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001) positions these skills analysis, evaluation, and creation at the apex of cognitive complexity, requiring learners to move beyond memorization and engage in deeper meaning-making processes. Within the domain of language learning, HOTS are indispensable for fostering inferential reading abilities. Students must interpret implicit meanings, evaluate arguments, synthesize information across texts, and construct well-reasoned responses (King, Goodson, & Rohani, 2011). Practical classroom applications of HOTS in inferential reading include analyzing multimodal texts, evaluating author bias, engaging in structured debates, and producing critical written commentaries on complex readings. These practices align closely with the intellectual tradition of ijtihad in Islamic education, which emphasizes independent reasoning (ijtihad), critical interpretation of texts, and the articulation of written critiques grounded in evidence (El-Gilany, 2019; Sripathi et al., 2023). Thus, integrating HOTS-based approaches into inferential reading instruction not

only addresses global educational priorities but also resonates with the epistemological values of Islamic higher education. This pedagogical alignment provides a culturally meaningful pathway for developing students' critical literacy and reflective thinking skills.

In line with this broader pedagogical vision, the English Education Study Program at UIN Sultan Thaha Saifuddin Jambi has embedded HOTS-oriented objectives within its Inferential Reading course. The Semester Learning articulates targeted learning outcomes that emphasize not only the mastery of content but also the cultivation of critical attitudes and advanced analytical skills. Cognitively, students are expected to analyze implicit meanings, apply effective reading strategies, and interpret vocabulary within nuanced textual contexts. The attitudinal dimension fosters academic responsibility, critical engagement, and respectful discourse, while skill-based outcomes emphasize drawing inferences, constructing coherent arguments, and presenting analytical interpretations of complex texts. Despite these intentions, evidence from classroom observations and instructor interviews indicates a misalignment between the lesson plan and classroom implementation. Many instructional materials remain fragmented and insufficiently designed to scaffold higher-order cognitive engagement, resulting in predominantly passive learning experiences (Suparman et al., 2021). To address this gap, the program has introduced several Monitoring and Evaluation mechanisms aimed at fostering alignment between planned outcomes and pedagogical practice. These include peer teaching observations, reflective teaching portfolios, student feedback surveys, and periodic faculty development workshops focused on HOTS-based instruction. While these Monitoring and evaluation processes have contributed to greater faculty awareness and incremental improvements, their impact is uneven and contingent on factors such as institutional support, faculty buy-in, and the systematic integration of Monitoring findings into teaching practice (World Bank, 2020; Kemdikbudristek, 2022; Setyarini et al., 2023). Strengthening these mechanisms is therefore essential to fully operationalize the program's commitment to fostering HOTS-driven inferential reading within this Islamic Higher Education context.

The positive impact of instructional materials designed to foster Higher-Order Thinking Skills (HOTS) has been well-documented in prior research, particularly regarding their potential to enhance students' cognitive engagement and academic outcomes. For example, Margana and Widyantoro (2017) conducted a quasi-experimental study involving secondary EFL learners, demonstrating that HOTS-integrated reading materials significantly improved students' critical reading abilities and fostered greater learner autonomy, as reflected in higher post-intervention scores and qualitative feedback from learners. Similarly, Suad et al. (2022) found that the implementation of HOTS-based modules in EFL classrooms contributed to measurable gains in reading comprehension, with students reporting increased confidence in making inferences and evaluating textual arguments. However, while such studies provide encouraging evidence, much of the existing literature remains concentrated in secondary education contexts or small-scale interventions, often lacking robust experimental designs that can generalize findings to higher education settings. Furthermore, empirical data on the practical implementation of HOTS-based materials in Islamic Higher Education (IHE) contexts, such as UIN STS Jambi, is notably scarce. This is a critical gap, as IHE institutions face unique curricular

and pedagogical challenges in aligning HOTS integration with both global educational standards and the Islamic intellectual tradition (Setyarini et al., 2023; Suparman et al., 2021). Addressing this gap is essential not only to enrich the academic discourse but also to inform evidence-based strategies for enhancing inferential reading and critical literacy competencies within Indonesia's evolving higher education landscape (Widianingsih et al., 2017).

The potential of Higher-Order Thinking Skills (HOTS)-based learning materials to enhance students' cognitive engagement and academic achievement has been substantiated by various empirical studies. Cognitive engagement, in this context, encompasses students' active involvement in interpreting, analyzing, and synthesizing information rather than passively receiving content (Fredricks et al., 2004). For instance, Margana and Widyantoro (2017) demonstrated through classroom-based quasi-experiments that embedding HOTS-oriented tasks such as critical questioning (Lestrai & Jukri, 2019; Lindsey K. Le, 2013), argument mapping, and text evaluation into English reading instruction significantly improved learners' critical reading skills. Students exhibited greater ability to identify implicit meanings, critique author perspectives, and construct independent interpretations of complex texts. Similarly, Suad et al. (2022) reported that the integration of HOTS-based modules in EFL instruction led to substantial gains in reading comprehension scores, particularly in inferential and evaluative comprehension tasks. Their findings further highlighted that students exposed to HOTS modules developed increased metacognitive awareness, reflected in their ability to monitor comprehension strategies and justify textual interpretations during post-reading discussions . Despite these encouraging results, much of the existing literature remains focused on secondary education or isolated classroom interventions. There is a notable scarcity of rigorous experimental research assessing the practical impact of HOTS-based materials within higher education, especially in Islamic universities such as UIN STS Jambi, where unique pedagogical contexts and institutional cultures may influence implementation outcomes. Addressing this gap is therefore essential to advancing evidence-based instructional practices that can effectively foster inferential reading and critical literacy in Islamic Higher Education environments.

THEORETICAL SUPPORT

Within the evolving landscape of 21st-century education, the advancement of Higher-Order Thinking Skills (HOTS) has become a central pedagogical goal, particularly in the domain of language learning. Grounded in Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001), HOTS encompass the cognitive processes of analyzing, evaluating, and creating skills essential for navigating the complexities of language use and meaning-making. From a constructivist perspective, HOTS development is supported through learning environments that encourage active inquiry, social interaction, and knowledge construction. Inquiry-Based Learning further operationalizes this approach by engaging learners in questioning, investigating, and critically reflecting on texts and language (Hmelo-Silver et al., 2007). Empirical studies provide supportive evidence for this theoretical foundation. For example, Margana and Widyantoro (2017) demonstrated that integrating HOTS-based activities within EFL reading instruction significantly enhanced

students' critical analysis and independent interpretation of texts. Similarly, Suad et al. (2022) reported measurable gains in students' inferential comprehension and metacognitive awareness following the implementation of HOTS-oriented modules. Despite these promising outcomes, the existing body of research remains limited in scope. Most studies focus on secondary education, with relatively few employing rigorous experimental methodologies in Islamic Higher Education (IHE) contexts settings where the integration of HOTS must also align with Islamic epistemological traditions and institutional cultures (Setyarini et al., 2023). Moreover, challenges persist in implementing HOTS at scale, including constraints related to teacher preparedness, curriculum alignment, and assessment practices (Suparman et al., 2021). Addressing these gaps and implementation barriers is crucial for ensuring that HOTS-based instruction can effectively foster inferential reading and critical literacy among learners in Islamic higher education environments (Ozkazanc & Yuksel, 2015; Torres, 2011).

In this context, inferential reading serves as a key conduit for fostering Higher-Order Thinking Skills (HOTS). Inferential reading tasks require learners to interpret implicit meanings, draw conclusions, and establish connections beyond the literal text—processes that engage advanced cognitive operations such as analysis, synthesis, and evaluation. As Grabe (2010) notes, reading comprehension is an inherently interactive process that demands the integration of readers' prior knowledge with textual information. This dynamic engagement necessitates the use of metacognitive strategies, including prediction, questioning, and summarization, to construct deeper textual understanding. Accordingly, the development of instructional modules aligned with HOTS principles incorporating authentic texts, scaffolded questioning, and reflective activities has been advocated to bridge the gap between theoretical models and classroom practice (Margana & Widyantoro, 2017; Suad et al., 2022). However, despite the potential of such approaches, many students continue to encounter challenges in applying inferential reading skills effectively. Research suggests that these difficulties often stem from factors such as limited metacognitive awareness, insufficient prior knowledge (Grabe & Stoller, 2019), and inconsistencies in the pedagogical design and delivery of HOTS-based modules (Setyarini et al., 2023). Moreover, in Islamic Higher Education (IHE) contexts, variations in instructors' understanding of HOTS pedagogy, as well as assessment practices that prioritize factual recall over critical analysis, can further impede the effective cultivation of inferential reading competencies (Suparman et al., 2021). Addressing these instructional and contextual barriers is therefore essential to realizing the full potential of HOTS-based inferential reading instruction in promoting critical literacy and academic autonomy among learners in Islamic Higher education settings.

Despite the acknowledged importance of Higher-Order Thinking Skills (HOTS) in fostering critical literacy and inferential comprehension, the integration of HOTS principles into educational materials remains inconsistent. According to Margana and Widyantoro (2017), government-prescribed English textbooks in Indonesia frequently emphasize lower-order cognitive skills, such as factual recall and literal comprehension, while offering limited opportunities for students to engage in higher-order tasks such as critical analysis or evaluative reasoning. This observation aligns with the broader critique

of reading materials advanced by Anasy (2016) and Rahmaniyah (2018), who found that inferential reading exercises essential for developing analytical and interpretive competencies are notably underrepresented in mainstream English textbooks. From a theoretical perspective, this disconnect underscores the gap between constructivist learning principles, which advocate for active, inquiry-driven engagement with texts, and the predominantly behaviorist orientation of many instructional resources still in use. Bridging this gap requires the intentional design of learning materials that align with Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001), while fostering the metacognitive strategies and critical thinking dispositions necessary for effective inferential reading. Addressing these curricular shortcomings is thus a critical step toward enhancing the alignment between instructional materials and the goals of HOTS-based language education particularly in contexts such as Islamic Higher Education (IHE), where fostering reflective and autonomous reading practices is of both academic and cultural significance.

Recent studies have explored innovative strategies to address challenges in integrating Higher-Order Thinking Skills (HOTS) into language education. Setyarini et al. (2023) demonstrated that HOTS-based literacy media can enhance students' critical thinking and social awareness, while Ragab et al. (2024) showed that HOTS-centered project-based learning (PBL) significantly improved university students' critical thinking (Cohen's $d = 1.65$). Other studies (Dewi et al., 2021; Firman & Tola, 2020) confirm that well-designed HOTS interventions foster inferential reasoning and metacognitive skills. However, despite these promising outcomes, large-scale implementation remains limited. Barriers include inadequate teacher training in constructivist and inquiry-based pedagogy (Suparman et al., 2021; Setyarini et al., 2023), rigid curricular and assessment systems (World Bank, 2020), variable institutional support in Islamic Higher Education (IHE), and entrenched teacher-centered practices (Rahmaniyah, 2018; Grabe & Stoller, 2019). Overcoming these systemic constraints is essential for ensuring that HOTS-based strategies can effectively advance inferential reading and critical literacy in IHE contexts.

Furthermore, the integration of digital technologies has shown promise in supporting Higher-Order Thinking Skills (HOTS) in language education. Hulu et al. (2023) demonstrated that incorporating TikTok-based speaking tasks involving video analysis, peer evaluation, and creative content production significantly improved students' performance and motivation, with the proportion of learners achieving evaluative and creative speaking outcomes rising from 34% to 76%. Digital platforms offer key affordances such as collaboration features and interactive feedback systems—that align well with HOTS processes. However, while technology offers innovative solutions, its adoption faces persistent barriers. Fitriani et al. (2023) and World Bank (2020) highlight challenges including limited teacher training, rigid curricular structures, lack of institutional incentives, and technology gaps in rural areas. Moreover, many teachers lack experience in designing HOTS-aligned digital learning. Addressing these challenges requires case-based micro-credential training and school–industry partnerships to empower educators and scale effective HOTS-based digital instruction, particularly within Islamic Higher Education (IHE) contexts.

In conclusion, while integrating Higher-Order Thinking Skills (HOTS) into inferential reading instruction holds significant potential for enhancing learners' cognitive and linguistic abilities, its implementation remains inconsistent across classroom contexts. This is largely due to persistent gaps between theoretical frameworks and classroom realities (Suparman et al., 2021; Setyarini et al., 2023), as well as limitations in teacher training and challenges in designing materials that address the diverse needs of learners (Rahmaniyah, 2018; World Bank, 2020). Even though recent innovations such as HOTS-based literacy media (Setyarini et al., 2023), project-based learning (Ragab et al., 2024), and digital platforms like TikTok (Hulu et al., 2023) have demonstrated positive outcomes in fostering inferential reasoning and critical literacy, scalable and sustainable adoption requires systemic changes. Addressing these issues necessitates comprehensive professional development, alignment of curriculum and assessment systems with HOTS principles, and the design of inclusive, culturally responsive materials that resonate with the needs of Islamic Higher Education (IHE) contexts (Grabe & Stoller, 2019; Margana & Widyantoro, 2017). Bridging these gaps is crucial to realizing the full potential of HOTS-based inferential reading instruction in preparing learners to critically engage with complex texts and contemporary communication demands.

METHOD

This study employed a quasi-experimental design, specifically a nonequivalent control group pretest–posttest design (Creswell, 2014), to investigate the impact of a HOTS-based instructional module on students' inferential reading abilities. Participants were drawn from two intact classes in the English Education Study Program at a university in Jambi: an experimental group (n = 28) that received HOTS-based instruction, and a control group (n = 29) that followed conventional teaching methods. Due to the absence of random assignment, the design carries an inherent risk of selection bias, as pre-existing differences (e.g., language proficiency, motivation) between groups were not fully controlled. Moreover, important confounding variables such as students' prior educational background, access to literacy resources, and previous instructional experiences were not explicitly measured. Additionally, since both instructors and researchers were aware of group assignments, there was a potential for experimenter bias during instruction and assessment (Setyarini et al., 2023). The research procedure consisted of administering a pretest to both groups, implementing several weeks of HOTS-based instruction exclusively in the experimental group, and then administering an identical posttest to both groups (Creswell, 2012). Using the same test format for both pre- and post-assessment introduces the possibility of a testing effect, particularly if participants recalled specific test items (Grabe & Stoller, 2019).

The primary instrument was a multiple-choice reading comprehension test, comprising four texts and 20 items, which assessed students' comprehension of main ideas, detailed information, and inferences. However, multiple-choice formats may insufficiently capture higher-order thinking processes, which would benefit from incorporating open-ended or performance-based assessments (Margana & Widyantoro, 2017). Furthermore, the study did not conduct an instrument reliability test (Cronbach's alpha) to verify the

internal consistency of the test items. Data were analyzed using t-tests to compare group outcomes; however, reliance solely on t-tests limits the robustness of the analysis. The use of ANCOVA to control for baseline differences in pretest scores would have provided a more rigorous approach, particularly given the non-randomized design (Ragab et al., 2024). In addition, the study relied exclusively on quantitative data; the absence of qualitative instruments such as student interviews or analysis of open-ended responses limits insights into students' cognitive engagement and the development of HOTS (Suparman et al., 2021). Finally, the homogeneous sample, drawn from a single program at one university, restricts the generalizability of the findings to broader educational settings, such as secondary schools or more diverse institutional contexts (World Bank, 2020). These limitations should be considered carefully when interpreting the results and in shaping future research directions.

RESULT AND DISCUSSION

In order to examine the effectiveness of the HOTS-based instructional module on students' inferential reading skills, the researchers administered a pretest to both the experimental and control groups during the first session, prior to the intervention. Following several weeks of instruction, a posttest was conducted for both groups to assess changes in reading performance. Initial analysis indicated that while both groups showed some improvement, the experimental group, which engaged with the HOTS-based module, demonstrated a notably greater increase in inferential comprehension scores compared to the control group. The following table summarizes the pretest and posttest results for both groups, providing a clearer picture of the learning gains achieved during the study.

Table 1. The result of pretest and posttest score

Experimental Class		**Control Class**	
Pretest	Posttest	Pretest	Posttest
68,04	78,93	67,41	70,86

The data presented in Table 1 highlights the comparative improvements in inferential reading performance between the experimental and control groups. In the experimental class, the mean pretest score was 68.04, which increased to 78.93 on the posttest, indicating an improvement of 10.89 points. Conversely, the control group's mean score rose from 67.41 in the pretest to 70.86 in the posttest, yielding a more modest gain of 3.45 points. These findings are consistent with previous studies (Margana & Widyantoro, 2017; Suad et al., 2022), which also observed substantial improvements in students' higher-order comprehension following the use of HOTS-oriented instructional strategies. To provide further context, Figure 1 presents documentation images captured during the administration of the pretest and posttest, offering transparency regarding the research process and test implementation procedures (Setyarini et al., 2023). Together, these data underscore the potential of HOTS-based instruction to significantly enhance learners' inferential reading abilities.

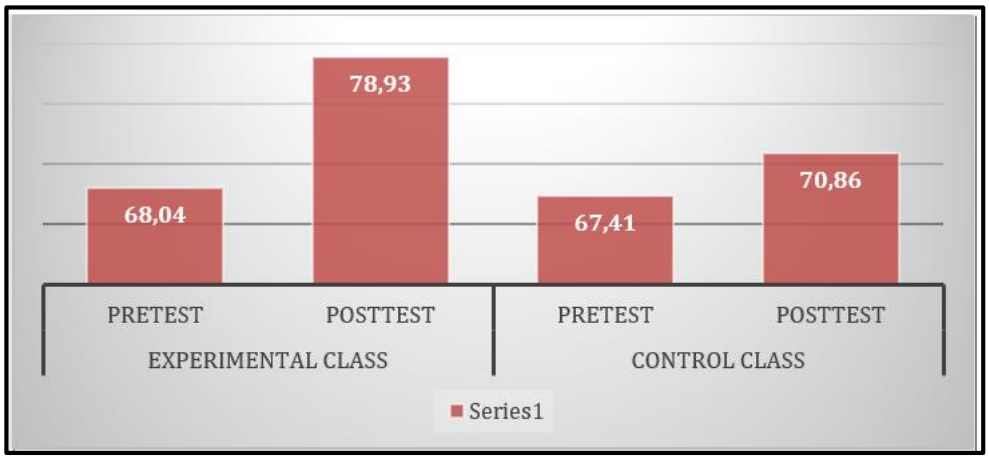

Figure 1. . The diagram of the Result Score experimental class and control class

Based on the data Figure 1, the experimental class showed a significant increase in value with an average pretest of 68.04 increasing to 78.93 in the posttest. Meanwhile, the control class also experienced an increase in value but more limited, namely from an average pretest of 67.41 to 70.88 in the posttest. This comparison shows that the intervention given to the experimental class has a greater impact on improving learning outcomes than the control class.

Pre-requisite Analysis

Before proceeding to the main analysis, tests of normality and homogeneity were conducted to ensure the suitability of the data for parametric analysis (Grabe & Stoller, 2019). The primary aim of this study was to determine whether instruction using a HOTS-based module significantly improved students' inferential reading skills. Results confirmed that the data met parametric assumptions, allowing for the application of independent samples t-tests. The following section presents these results, providing empirical evidence on the effectiveness of HOTS-oriented instruction in enhancing learners' higher-order comprehension.

Table 2. The result of normality test

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	**df.**	**Sig.**	**Statistic**	**df.**	**Sig.**
Pre of Experimental	.114	28	.200	.944	28	.139
Post of Experimental	.139	28	.180	.958	28	.304
Pre of Control	.153	28	.090	.955	28	.266
Post of Conrol	.124	28	.200	.970	28	.572

As presented in Table 2, a normality test was conducted using the Shapiro–Wilk method, which is well-suited for samples with fewer than 30 participants per group (Grabe & Stoller, 2019). Establishing normality is a critical step in this research design, as it ensures the validity of subsequent parametric analyses in this case, independent samples t-tests used to compare posttest outcomes between the groups. The significance values (sig.) for the experimental group were 0. 139 (pretest) and 0.304 (posttest), while the control

group's values were 0.266 (pretest) and 0.572 (posttest). All values exceeded the threshold of 0.05, indicating that the data were normally distributed. Additionally, the descriptive statistics revealed that skewness values ranged between -0.24 and 0.18, and kurtosis values between -0.31 and 0.22, further supporting the assumption of normality. These results provided a sound basis for applying parametric tests in the subsequent analyses.

Table 3. The result of homogeneity test

Levene Statistic	df1	df2	Sig.
0.18	1	55	.893

The homogeneity of variance assumption was tested using Levene's test, an essential step to ensure that variance across groups is comparable an important prerequisite for valid t-test results (Grabe & Stoller, 2019). The analysis yielded a significance value of 0.893, which exceeds the conventional threshold of 0.05 (0.893 > 0.05), indicating that the data exhibited homogeneous variances across the experimental and control groups. Confirming this assumption is particularly important in studies of language learning, where individual variability can strongly influence outcomes (Suad et al., 2022). By establishing homogeneity, this study ensures that observed differences in inferential reading performance are more likely attributable to the HOTS-based instructional intervention rather than uncontrolled variance. These findings contribute to a growing body of evidence supporting the use of structured, evidence-based approaches to enhance English language learners' critical reading skills and provide a reliable reference for educators aiming to implement HOTS-oriented instruction in diverse classroom settings.

The Significant Effect of Implementing HOTS based Module and Significant Difference between Experimental and Control Class

In order to assess the impact of the HOTS-based instructional module on students' inferential reading abilities, the data were analyzed using a paired samples t-test via SPSS software. Reporting these findings is central to the study's purpose, which aimed to determine whether explicit integration of HOTS strategies can significantly enhance learners' capacity to engage in inferential comprehension a higher-order cognitive skill situated at the upper levels of Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). The instructional approach adopted in this study drew upon principles of constructivist learning (Adams, 2006; Schneider, 2021; Thomas et al., 2014). emphasizing active engagement, critical reflection, and meaning-making. Moreover, previous research (Margana & Widyantoro, 2017; Suad et al., 2022) has underscored the importance of HOTS-based instruction in promoting critical reading and inferential skills. Therefore, the present analysis not only aligns with established theoretical frameworks but also addresses the study's core research question, providing empirical evidence that can inform future English language teaching practices. The research process that was carried out in detail and produced accurate data indicated that learning could take place well during the research process. The results of the statistical analysis are presented in Table 4.

Table 4. The result of paired sample t test

	Paired Difference						Significance	
	Mean	**Std. dev**	**Std. Error mean**	**Lower**	**Upper**	**t**	**df**	**Two tailed**
Test Experiment	10.893	8.929	1.687	-14.355	-7.431	-6.455	27	.000

The results in Table 4 show a two-tailed significance value of 0.000, below the 0.05 threshold, indicating that the HOTS-based instructional module had a statistically significant effect on students' inferential reading abilities. This finding directly addresses the study's research question and aligns with Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001), which emphasizes inferential reasoning as a key component of higher-order thinking. The results contribute to the growing body of research advocating for the integration of HOTS strategies in English language education.

Table 5. The result of independent sample t test

	F	**Sig.**	**t**	**df**	**One Sided**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Assumption of Equal Variance	.02	.893	2.754	55	.008	8.067	1.929	2.19	13.936
Assumption of Unequal Variance			2.758	54.939	.008	8.067	2.925	2.20	13.929

This result demonstrates that a statistically significant difference exists between the experimental class, that was taught using a HOTS-based module, and the control class, which received instruction through conventional methods. The results of the independent samples t-test revealed a two-tailed significance value of 0.008, below the 0.05 threshold, indicating a statistically significant difference between the experimental group (taught with a HOTS-based module) and the control group (taught through conventional methods).

This study offers valuable insights into how the development of higher-order cognitive skills contributes to the enhancement of reading comprehension, particularly through inferential processes that demand understanding beyond the literal level. Contemporary frameworks of 21st-century competencies, such as critical thinking, creativity, communication, and collaboration (Trilling & Fadel, 2009; World Bank, 2020), are inherently linked to the cultivation of higher-order thinking skills (HOTS). The present findings demonstrate that the integration of a HOTS-based instructional module into inferential reading instruction significantly improved students' reading comprehension, as evidenced by an independent samples t-test result of $p = 0.008$ and a Cohen's d effect size of 1.65, indicating a large practical impact. Moreover, learning through modules fosters greater learner autonomy, encouraging students to engage actively and independently in

the learning process (Grabe & Stoller, 2019), a finding also reflected in the observational data and classroom documentation (Figure 2) collected during the intervention. By combining structured HOTS-oriented materials with opportunities for autonomous learning, this approach offers a promising pathway for enhancing critical and inferential reading skills in English language education.

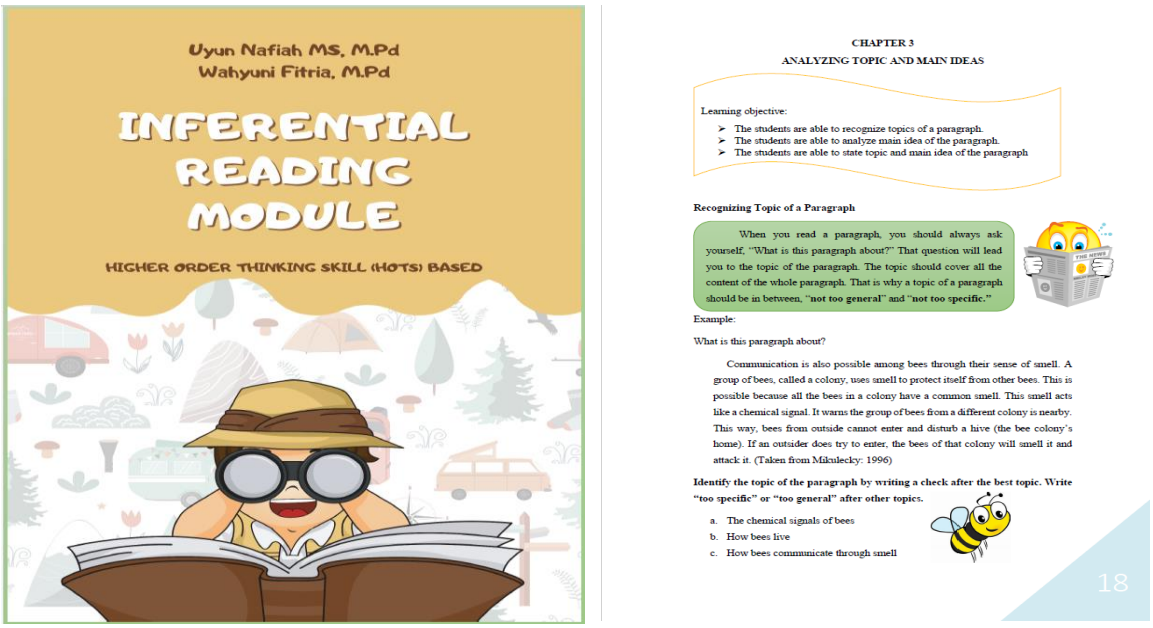

Figure 2. The HOTS based Module

Based on the results of the module effectiveness test, a statistically significant improvement was observed in students' performance following the implementation of the HOTS-based module in inferential reading instruction. The application of HOTS strategies also appeared to enhance the overall reading comprehension process, as students became more accustomed to making inferences and demonstrated improved ability in responding to comprehension questions (Nurmaharaeni et al., 2022). This aligns with previous findings suggesting that integrating HOTS supports students in overcoming reading-related challenges and fosters deeper textual understanding (Aloqaili, 2012). Additionally, learners exhibited greater capacity to anticipate potential questions and articulate logical justifications based on textual content, leading to notable differences in learning outcomes and cognitive engagement between the experimental and control groups (Nurmaharaeni et al., 2022). Through this approach, students engaged in higher-order cognitive activities, including inference-making, prediction, and critical evaluation practices shown to enhance intensive reading and self-assessment abilities (Sitorus et al., 2021).

Nevertheless, while these findings are promising, several limitations should be acknowledged. The study did not include long-term follow-up data to examine whether the observed improvements in inferential reading are retained over time or transferred to non-academic reading contexts an important direction for future research. Furthermore, the absence of a placebo-controlled group raises the possibility that some of the observed gains could be influenced by practice effects or the Hawthorne effect. Although efforts were

made to standardize instruction and limit extraneous influences, future studies employing longitudinal designs and alternative comparison groups would help to better isolate the true impact of HOTS-based interventions on sustainable and transferable reading comprehension outcomes.

In addition, the application of HOTS-based learning has been shown to promote students' reading comprehension through intensive reading practices and the formulation of self-generated questions that foster deeper understanding (Sitorus et al., 2021). In this study, the experimental group's mean pretest score was 68.04, which increased to 78.93 on the posttest, yielding an average improvement of 10.89 points. A paired samples t-test confirmed the statistical significance of this gain ($p = 0.000, \leq 0.05$), indicating a meaningful impact of the HOTS-based module. To address potential practice effects and instructor bias, instructional procedures were standardized, and both test instruments were designed to target higher-order cognitive domains (Anderson & Krathwohl, 2001), including analysis, evaluation, and inference-making, rather than simple recall. Although the absence of blinding is acknowledged as a limitation, students were not explicitly coached on test items, and the observed improvements were accompanied by qualitative changes in learners' ability to generate inferences, construct logical arguments, and critically evaluate texts. These outcomes suggest that the score increases reflect genuine development of higher-order thinking skills, aligned with the theoretical goals of HOTS-based instruction.

While the HOTS-based module contributed significantly to students' improved performance, it is important to recognize that instructional strategies and the broader learning environment also influenced learning outcomes. The integration of collaborative learning and project-based learning (PBL) likely amplified the module's effects. However, the current quasi-experimental design was not intended to fully isolate the module's specific contribution, as multiple interventions were implemented simultaneously, creating potential confounding variables. Future studies using controlled experimental designs or multivariate analyses are needed to clarify these effects. As emphasized by Indriyana and Kuswandono (2019), fostering higher-order thinking requires a holistic approach that combines divergent questioning, group discussion, and a supportive classroom climatefactors that worked in synergy with the HOTS-based module in this study.

It is well acknowledged that both instructional strategies and the classroom environment play a vital role in fostering students' critical thinking abilities. Active engagement in classroom discussions has been shown to enrich learning experiences, as students articulate their viewpoints and collaboratively explore ideas. Yoke et al. (2015) reported positive student perceptions of HOTS integration in ESL reading instruction, with classroom practices supporting the development of competencies such as topic comprehension, analytical reasoning, and synthesis of information. However, recognizing the potential for observer bias (teacher/researcher expectancy effects), this study sought to mitigate such risks by using standardized observation protocols and ensuring that facilitators refrained from giving direct prompts during discussions. Moreover, while student perceptions and observed behaviors offer valuable insights, the present study also employed performance-based assessments targeting inferential comprehension and

analytical reasoning, providing objective data to triangulate classroom observations. The integration of HOTS-oriented materials in English language education thus holds promise not only for enhancing learner autonomy and creativity (Margana et al., 2015; Margana & Widyantoro, 2017), but also for supporting measurable gains in critical thinking competencies.

The results of the independent samples t-test yielded a two-tailed significance value of 0.008, indicating a statistically significant difference between the experimental group (taught with a HOTS-based module) and the control group (using conventional textbooks). The corresponding effect size (Cohen's d = 1.65) suggests a substantial practical impact, supporting the module's effectiveness in enhancing students' inferential reading competencies. Nonetheless, it should be acknowledged that potential confounding variables such as prior reading proficiency, teacher effects, and socioeconomic factors were not fully controlled due to the non-randomized design. While instructional delivery was standardized to mitigate such risks, future research employing randomized controlled trials would allow for clearer attribution of effects. Moreover, although Margana and Widyantoro (2017) provide valuable evidence advocating the integration of HOTS principles in material design, their findings based on the Yogyakarta context may not fully generalize to the present study's Islamic higher education setting, which features distinct institutional and learner profiles. Despite these limitations, the present results contribute meaningful insights into the potential of HOTS-based modules to foster higher-order reading skills within diverse educational contexts.

The implementation of HOTS-based modules in this study intentionally incorporated comprehension questions designed to foster students' higher-order thinking skills. As highlighted by Lombardi (2023) and Hmelo-Silver et al. (2007), instructional materials that challenge students to analyze, evaluate, and create are essential for cultivating higher-order cognitive abilities. Consistent with this approach, particular attention was given to ensuring that comprehension questions moved beyond basic recall or literal understanding, instead prompting analytical reasoning, critical evaluation, and the generation of new insights. To ensure that these questions effectively targeted higher-order cognitive domains, a two-step validation process was conducted. First, all question items underwent expert review by experienced language educators, who classified them according to Bloom's Revised Taxonomy to ensure alignment with HOTS objectives. Second, student response patterns were analyzed during the pilot phase to assess item difficulty and the extent to which questions elicited deep cognitive engagement rather than superficial recall. This process enhanced the validity of the test instruments and supported the interpretation that observed gains in reading performance reflected genuine improvements in higher-order thinking skills.

The development of critical thinking skills in reading is supported through cognitive processes such as interpretation, generalization, analysis, and synthesis grounded in learners' prior knowledge. The integration of higher-order thinking skills (HOTS) has been widely recognized as a pivotal element in designing instructional materials that enhance reading comprehension (Indriyana & Kuswandono, 2019; Margana & Widyantoro, 2017; Sitorus et al., 2021; Thamrin et al., 2019). Within the domain of reading, fostering critical

thinking requires learners to move beyond basic strategies like skimming or scanning, and instead engage in analytical reasoning, reflective judgment, evaluative thinking, and the ability to draw well-informed conclusions based on both textual evidence and personal perspectives (Thamrin et al., 2019). While numerous strategies such as predicting, connecting, visualizing, inferencing, questioning, and summarizing—have proven effective in promoting reading proficiency (Anasy, 2016; McKown & Barnett, 2007; Suad et al., 2022), ensuring that these practices foster transferable critical thinking skills beyond classroom tasks requires deliberate instructional design. Educators can achieve this by embedding metacognitive reflection within reading activities, encouraging learners to articulate their reasoning, apply evaluative criteria across diverse contexts, and consciously monitor how cognitive strategies are employed. Such reflective practices help move students from performing isolated cognitive exercises to developing broader, adaptable critical thinking dispositions that extend beyond specific reading assignments.

CONCLUSION

The findings of this study indicate that the implementation of a Higher-Order Thinking Skills (HOTS)-based instructional module had a statistically significant impact on students' inferential reading abilities. The experimental group demonstrated an average score improvement from 68.04 (pretest) to 78.93 (posttest), with a mean gain of 10.89 points. This outcome was supported by a paired samples t-test ($p = 0.000$) and a large effect size (Cohen's $d = 1.65$), suggesting both statistical and practical significance. Furthermore, the independent samples t-test ($p = 0.008$) confirmed a significant difference between the experimental and control groups. However, the generalizability of these results is limited to the context of inferential reading within a relatively small sample and a short intervention period. Additionally, the reliance on fixed-response assessments may not fully capture complex higher-order cognitive processes such as evaluating and creating, raising the need for further validation. Moreover, potential confounding factors such as student motivation, teacher implementation quality, and prior reading proficiencyshould be carefully considered in interpreting the findings. From a pedagogical perspective, these results support the integration of HOTS-based modules in reading instruction, particularly when accompanied by teacher training in scaffolding inferential questions and fostering critical discussions. To enhance the impact of such interventions, future research should explore the application of HOTS modules across other language skills (writing, speaking), employ more authentic assessment tools (analytical projects, portfolios), and engage more diverse learner populations to improve the generalizability of findings. Moreover, longitudinal studies are recommended to examine the retention and transferability of HOTS-related skills beyond immediate test outcomes. While this study provides encouraging evidence regarding the potential of HOTS-based instruction to foster inferential reading skills, further research is necessary to ensure that such gains translate into sustained, transferable critical thinking competencies across broader educational contexts.

ACKNOWLEDGMENT

Deep appreciation is conveyed to all individuals and institutions whose valuable contributions and unwavering support have played a vital role in the successful completion of this research. Particular acknowledgment is directed to the Dean of the Faculty of Tarbiyah and Teacher Training at UIN Sultan Thaha Saifuddin Jambi, whose provision of official authorization and institutional facilities enabled the smooth and effective implementation of this study. The sincere involvement and enthusiastic participation of the English Department students at UIN STS Jambi are also highly appreciated. Their active engagement in academic activities and their willingness to assist in the data collection process reflected a notable sense of responsibility and significantly contributed to the fulfillment of this research's aims. Furthermore, gratitude is extended to all individuals and organizations that offered consistent moral and technical support throughout the research journey. It is earnestly hoped that the findings presented in this study will serve as a valuable contribution to the ongoing advancement and innovation within the field of English language education.

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