

Artificial Intelligence Generated Summaries as Digital Scaffolds to Support Learners' Discourse Level Comprehension of Complex Texts in an Indonesian Senior High School

 <https://doi.org/10.31004/jele.v11i2.2228>

*Rayval Mustafa, Yanuarius Yanu Dharmawan^{ab} 

¹²Universitas Bandar Lampung, Indonesia

Corresponding Author: rayval.22611029@student.ubl.ac.id

A B S T R A C T

Discourse-level comprehension is essential for academic literacy, as it enables students to follow arguments across paragraphs, evaluate evidence, and engage in critical reading. In Indonesian EFL classrooms, many senior high school students struggle not only with vocabulary but also with constructing coherent understanding from complex texts. Difficulties in tracking references, connecting ideas, and recognizing rhetorical organization often limit deeper comprehension. This qualitative case study was conducted in a Grade XI class at a private urban senior high school in Bandar Lampung, Indonesia. While classroom activities involved the whole class, eight students were purposively selected for think-aloud protocols and focus group discussions to allow in-depth analysis. Data were collected through observations, think-aloud sessions, discussions, and learning artifacts, and analyzed using reflexive thematic analysis. Findings show that ChatGPT-generated summaries functioned as digital scaffolds, helping students clarify key relationships and verify understanding against the source text, thereby supporting more deliberate and evidence-based reading.

Keywords: *ChatGPT-Generated Summaries, Discourse-Level Comprehension, EFL Reading, Digital Scaffolding, Academic Literacy*

Article History:

Received 28th February 2026

Accepted 30th March 2026

Published 31st March 2026



INTRODUCTION

Language plays a vital role in both communication and academic development, particularly in English as a Foreign Language (EFL) contexts such as Indonesia. At the senior high school level, learning English extends beyond mastering vocabulary and grammar. Students are expected to move past sentence-level understanding by connecting ideas across paragraphs, examining how claims are supported, and recognizing how texts develop coherent arguments (Herawati & Istinganah, 2024; Hidayat, 2024). These demands reflect discourse-level reading processes that position reading as a fundamental academic skill. Through such processes, students access information, evaluate evidence, and engage critically with written material (Zhang, 2023).

Despite these expectations, many Indonesian EFL students continue to experience difficulty when engaging with complex English texts. Challenges frequently arise from limited vocabulary, syntactically dense sentences, unclear referential links, and reduced motivation, often resulting in slow reading and fragmented comprehension (Ramadianti & Somba, 2023; Nurmalasari & Haryudin, 2021). Moreover, comprehension is not shaped solely by linguistic knowledge. Affective and cognitive factors also influence how successfully students construct meaning, particularly when texts require sustained attention and integration of information (Alfiani et al., 2024). Reading self-efficacy, for example, has been shown to differentiate comprehension performance in online extensive reading contexts, indicating that confidence, engagement, and persistence meaningfully affect how learners approach longer texts (Anggia et al., 2023).

In this study, complex texts are understood as texts that require readers to interpret meanings that are not always stated explicitly. Comprehending such texts involves tracing connections across paragraphs, resolving references (such as identifying what pronouns like “they,” “it,” or “this” refer to), and recognizing how ideas are structured and developed. Within Indonesian senior high school settings, complex texts commonly include argumentative essays, popular science articles, and structured reports. Argumentative texts, in particular, demand that students identify how claims, warrants, and evidence are organized, adding another layer of discourse-level processing beyond vocabulary and sentence meaning (Dharmawan et al., 2023). Students often encounter difficulty when referents appear several sentences earlier or when relationships such as cause-effect, comparison, hedging, or implied counterarguments must be inferred rather than directly stated (Abdollahi-Guilani, 2022). Without sufficient support at this level, learners may resort to surface reading strategies, rely heavily on word-for-word translation, and gradually disengage from English texts (Wirth et al., 2022).

Classroom observations at Al-Azhar 3 Senior High School in Bandar Lampung illustrate these challenges in practice. During reading sessions, some students postponed beginning tasks, while others immediately turned to translation tools. Several were able to understand individual sentences yet hesitated when asked to explain how a main claim was supported or how one paragraph connected to the next. In many instances, the difficulty was not simply unfamiliar vocabulary, but sustaining meaning across the text while remaining engaged. This pattern aligns with research suggesting that students' engagement, enjoyment, and learning experiences influence how persistently they approach complex language tasks (Hidayati et al., 2024), especially tasks that require integrating information across sentences and paragraphs. These classroom observations also correspond with broader assessment data. PISA 2022 results indicate that only around 25% of Indonesian students reached Level 2 or higher in reading, with the national average score significantly below the OECD benchmark. This suggests that although students may decode text, constructing global meaning through cohesion tracking and coherence building remains a substantial challenge.

In response to this issue, the present study examines ChatGPT-generated summaries as a form of digital scaffolding during the reading of complex texts. Scaffolding refers to temporary support that enables learners to complete tasks they cannot yet perform independently, with the broader goal of fostering autonomy. In reading contexts, effective scaffolding does not replace the original text; rather, it helps students approach it with greater clarity, notice relationships between ideas, and monitor their understanding. ChatGPT-generated summaries may provide an initial overview, highlight central arguments, and reduce the cognitive demands posed by lengthy and dense passages (Adiguzel et al., 2023; Wen & Wang, 2023; Vázquez-Cano et al., 2023). The contribution of this study lies not merely in using ChatGPT, but in examining how such summaries function in relation to specific discourse-level processes and how students strategically move between the summary and the original text. The study identifies integration patterns such as overview-first reading, read-then-verify, cross-validation, and overreliance-correction, linking them to indicators including cohesion tracking, coherence building, inference-making, and recognition of rhetorical structure.

Given that generative tools can produce fluent yet imperfect outputs, issues of reliability are treated as integral to instructional design rather than secondary concerns. ChatGPT-generated summaries may omit qualifications, simplify causal relationships, or introduce claims not fully supported by the source text. For this reason, verification is embedded into the reading tasks. Students are encouraged to treat summaries as provisional guides rather than substitutes for reading and to confirm key claims, referents, and rhetorical moves by returning to the original passage. This process is intended to maintain attention to textual evidence and prevent superficial acceptance of automatically generated content (Adiguzel et al., 2023; Wen & Wang, 2023; Vázquez-Cano et al., 2023).

This study addresses two central questions: first, how ChatGPT-generated summarization influences students' discourse-level comprehension, including cohesion, coherence, inference-making, and recognition of rhetorical structure; and second, how students integrate AI-generated summaries with the original text during reading. Rather than focusing solely on performance outcomes, the study investigates how meaning-making unfolds in real classroom contexts.

To enhance credibility, the study adopts a triangulated approach that connects observed behavior, verbalized reasoning, and produced artifacts. Classroom observations document visible reading actions, such as pauses, consultation of translation tools, shifts to summaries, and returns to the source text for verification. Think-aloud protocols provide insight into moment-by-moment reasoning, including reference resolution and inference-making. Focus group discussions offer reflective accounts of students' strategic decisions and responses to uncertainty when summaries and source texts appear misaligned. These data sources are interpreted collectively so that claims are grounded in recurring patterns rather than isolated evidence.

The research was conducted in one Grade XI class at an Indonesian senior high school. Its focus is on discourse-level comprehension and students' integration of ChatGPT-generated summaries with original texts. The study does not compare AI platforms, measure vocabulary gains, or calculate effect sizes. Instead, it seeks to provide an in-depth account of how students construct meaning with digital scaffolding – when it supports discourse-level understanding and when it risks reducing careful reading. To ensure transparency, the Findings section presents a joint display table that links each theme to converging evidence from observations, think-aloud data, focus group discussions, and representative excerpts.

Literature review

This study is grounded in three complementary perspectives that, together, explain why discourse-level reading is difficult for many EFL students and why AI-generated summaries may function as a useful but imperfect support. The first is the Construction-Integration Model (Kintsch, 1998), which views reading as an active meaning-making process rather than a simple act of decoding. Readers build understanding by constructing propositions from the text and integrating them with prior knowledge to form a coherent mental representation. In this view, comprehension depends on the reader's ability to connect information across sentences and paragraphs, maintain coherence when ideas become dense, and repair understanding when the text becomes confusing. This model also helps explain why reading comprehension is rarely "purely linguistic." Cognitive and affective correlates such as attention, persistence, and how students regulate their thinking can shape what readers manage to construct and integrate while reading (Alfiani et al., 2024). It also aligns with findings that students' reading self-efficacy relates to how they engage with reading tasks and how consistently they sustain effort, especially in extended or online reading contexts (Anggia et al., 2023).

Van Dijk's discourse macrostructure theory (van Dijk, 1980) extends this explanation by shifting attention from local connections to the global organization of a text. Readers do not only need to understand sentences; they need to see how the text is built as a whole. Macrostructure theory helps explain why students may correctly understand individual lines yet still fail to explain what the author is arguing overall. To reach a global understanding, readers must identify main themes, compress details into higher-level propositions, and recognize how major parts of the text relate to one another. This becomes especially relevant for complex texts such as argumentative essays and expository articles, where understanding often hinges on recognizing how claims are supported, how evidence is positioned, and how counterarguments and conclusions function within the larger rhetorical direction of the text. Work on argumentative writing structures in Indonesian learner contexts also points to how challenging it can be to manage claim-support relationships systematically, suggesting that learners may need explicit support to notice and interpret argumentative organization (Dharmawan et al., 2023).

The third perspective comes from sociocultural theory (Vygotsky, 1978), which emphasizes that learning and higher mental processes develop through social interaction and the use of mediating tools. From this viewpoint, students' reading development is shaped not only by what they can do alone, but also by the support available within their Zone of Proximal Development. Scaffolding refers to temporary assistance that helps learners carry out tasks that would otherwise be too demanding, with that support gradually reduced as learners gain control. Sociocultural work in Indonesian EFL classrooms also highlights that learners' meaning-making is shaped by classroom norms, available semiotic resources, and how students perceive what "counts" as acceptable language practice (Cahyanti & Dharmawan, 2025). In the context of this study, AI-generated summaries are treated as digital mediating tools. They can provide an entry point into complex texts and help students orient themselves to meaning, but they do not automatically produce learning. Whether summaries become productive scaffolds depends on how students use them, how teachers frame them, and whether students remain anchored to the original text rather than shifting into passive acceptance of the summary.

Prior research on digital scaffolding in language learning generally supports this interpretation. Chen (2020) observed that learners may initially treat scaffolding tools as shortcut devices for checking answers, especially when they feel pressed for time or lack confidence. However, as learners become more familiar with the tools and receive guidance, they can begin to use scaffolds more strategically, not only to obtain an answer but to develop a clearer understanding of the task itself. Chen (2021) later showed that integrated digital scaffolds can promote learner autonomy, yet the study also underlined an important condition: autonomy does not simply emerge because a tool exists. Teacher guidance still matters, particularly in shaping how learners interpret support, when they consult it, and how they return to the original task after receiving assistance. Similarly, Liu et al. (2022) argue that scaffolding in digital settings should be understood as flexible instructional support that works across cognitive and affective dimensions, helping learners manage both the intellectual complexity of tasks and the emotional demands of sustained engagement (Chairinkam & Yawiloeng, 2024). This emphasis on the affective side of learning is consistent with findings that students' enjoyment and multimodal learning experiences can influence how they participate and persist in EFL tasks, which matters when reading requires sustained attention across long passages (Hidayati et al., 2024). These insights are relevant for reading complex texts, where students often struggle not only with information density but also with frustration, uncertainty, and low persistence.

In discourse-level reading, the difficulty is not limited to understanding vocabulary or grammar. Smith et al. (2021) describe comprehension as an interaction between textual information and prior knowledge, where meaning emerges through connecting, updating, and revising interpretations as the text progresses. Kim (2020) highlights that working memory, vocabulary knowledge, and inference skills play a key role in maintaining coherence across paragraphs, particularly when texts require readers to hold multiple propositions in mind while integrating new information. This discourse-level demand is also consistent with the argument that reading comprehension is tied to interlocking cognitive and affective factors, not just language knowledge, especially when students are expected to evaluate relationships between ideas and remain engaged in challenging tasks (Alfiani et al., 2024). Discourse-level understanding typically involves several interrelated components. Cohesion includes tracking pronoun references and interpreting connective signals that indicate addition, contrast, cause, or consequence. Coherence refers to building logical links among ideas so that the text forms a sensible whole rather than a list of separate sentences. Inference-making fills gaps when key meanings are implied rather than stated, and rhetorical awareness involves recognizing how the text is structured to persuade, explain, compare, or justify. When students struggle in any of these areas, the result is often surface-level comprehension: they can translate sentences, but they cannot explain relationships among ideas, identify the author's purpose, or trace how the argument develops.

Studies on EFL reading comprehension consistently report challenges that mirror these discourse-level demands. Hezam et al. (2022) found that vocabulary limitations and word recognition problems remain major barriers for Saudi EFL learners, which can disrupt the flow of reading and reduce capacity for higher-level integration. Kim & Lee (2024) identified differences in proficiency related to fluency and decoding, suggesting that when basic processing is slow, readers have fewer cognitive resources left for building coherence. Stevani et al. (2022) demonstrated that instruction in contextual clues can support comprehension, indicating that strategic reading instruction can help learners move beyond word-by-word translation. Vongsawath et al. (2025) also reported that without structured support, students struggle with summarizing and identifying main ideas, which are precisely the skills needed to form a macro-level understanding of complex texts. Within Indonesian contexts, the role of self-efficacy is also relevant here: when students doubt their ability to understand English texts, they may disengage early or rely on shortcut strategies rather than working through the discourse links that build comprehension (Anggia et al., 2023). Recent findings on reading comprehension correlates similarly suggest that both affective readiness and cognitive processing are intertwined with comprehension outcomes (Alfiani et al., 2024).

Alongside this, research on AI-based summarization tools provides an important lens for understanding the kind of support ChatGPT can offer. Pu & Demberg (2023) note that ChatGPT can generate coherent and adaptable summaries, which suggests potential value for helping students grasp main points and overall direction of a text. At the same time, they caution that inaccuracies may occur, meaning that a summary can sound fluent while still being partially misaligned with the source. Yang et al. (2023) similarly found that ChatGPT can perform comparably to more refined summarization systems, but they also observed that outputs may be longer and may contain factual inconsistencies. For educational use, this matters because students may treat a well-written summary as automatically trustworthy, especially when the original text feels difficult. In practice, this risk can interact with motivational and affective factors: students who feel overwhelmed may prefer a summary because it reduces effort, even if that choice weakens deeper comprehension and rhetorical awareness (Hidayati et al., 2024; Anggia et al., 2023). This reinforces the need to treat AI-generated summaries not as final answers, but as provisional support that should be checked against textual evidence.

Across the body of research, a consistent gap becomes evident. Much of the prior work concentrates either on measuring reading achievement through test results and performance metrics or on assessing AI tools from a technical standpoint, emphasizing the quality of summaries rather than the processes involved in learning. Only a limited number of studies closely examine how students actually engage with texts when AI assistance is present, particularly in authentic classroom contexts where factors such as confidence, participation, and classroom culture influence their actions (Alfiani et al., 2024; Anggia et al., 2023; Cahyanti & Dharmawan, 2025). Within Indonesian senior high schools, in particular, there is still little empirical evidence on how learners integrate AI-produced summaries with the original material and how this combination affects higher-level comprehension, including tracking cohesion, constructing coherence, drawing inferences, and recognizing rhetorical structures. Adopting a qualitative design, the present study addresses this shortfall by closely documenting students' reading practices and examining the strategies that emerge when AI-generated summaries are used as scaffolding for complex texts.

METHOD

This study adopts a qualitative case study design to closely examine how Grade XI EFL students make sense of complex English texts when supported by ChatGPT-generated summaries. Rather than testing effectiveness through scores, it focuses on discourse-level reading processes as they unfold during classroom tasks: how students track cohesion and coherence, make inferences, recognize rhetorical structure, and strategically move between the AI summary and the original text (Erbas et al., 2025; Puspitasari & Aufar, 2021). The case study

approach is used because it allows an in-depth, context-sensitive view of students' lived reading experiences while still capturing variation across individuals within the same classroom. Multiple data sources are used to build a rich picture of the same phenomenon from different angles, including classroom observation, think-aloud protocols, focus group discussion, and learning artifacts (Wolcott & Lobczowski, 2021).

The study was conducted at Al-Azhar 3 Senior High School in Bandar Lampung, a private urban secondary school. Participants were drawn from one Grade XI class, and the selected participants included both male and female students. Using purposive sampling, approximately eight students were selected for the more intensive components (think-aloud and FGD) and were consistently tracked across activities to follow their reading processes over time. Selection was based on regular attendance, willingness to participate, and the ability to articulate reading strategies during preliminary classroom interaction. The selected students represented varying levels of reading confidence as identified by the English teacher, and their overall English proficiency corresponded to the lower-intermediate to intermediate level expected in the Grade XI curriculum. This small, information-rich sample is appropriate because the study prioritizes depth of process over breadth or frequency, and reflexive thematic analysis emphasizes methodological fit between research aims, data richness, and the nature of the claims (Braun & Clarke, 2023; Braun & Clarke, 2024).

The reading session involved argumentative and expository texts commonly used in the Grade XI curriculum. These genres were selected because they require students to identify claims, supporting evidence, counterarguments, and logical relations across paragraphs. Text complexity was determined by features such as multi-paragraph length, syntactic density, implicit referential links across sentences, and the presence of argumentative structures including cause-effect relations and hedging. Evidence was gathered through an observed reading session using standardized summaries limited to 120 words, followed by individual think-aloud sessions (about 10–15 minutes) and a semi-structured FGD (about 30–40 minutes) guided by an interview protocol adapted from the IPR framework (Castillo-Montoya, 2016). Observation notes, audio recordings, transcripts, and student annotations were securely stored, anonymized, and organized with timestamps and participant codes (Smith et al., 2013).

ChatGPT was explicitly used as the AI summarization tool in this study. Summaries were generated using a teacher-designed prompt requesting a concise overview of the main argument and key supporting points of the text. Students first read the original text independently before accessing the AI-generated summary. They were instructed to treat the summary as a provisional overview and to verify its alignment with the source text by cross-checking claims and referential links. This structured guidance positioned ChatGPT as a mediating support within the reading process rather than a substitute for engagement with the original passage.

Data were analyzed using reflexive thematic analysis (Braun & Clarke, 2006), supported by a discourse perspective to keep attention on cohesion, coherence, inference-making, and rhetorical structure (van Dijk, 1980). Incidents from observations, think-alouds, FGDs, and artifacts were coded both deductively (based on the discourse indicators) and inductively (to capture how students actually integrated summary and text, such as overview-first, read-then-verify, cross-validation, and overreliance-correction). Because AI outputs may contain inaccuracies, summary reliability was treated as part of the analytic design by labeling summaries as aligned, partially aligned, or misaligned with the source text. Credibility was strengthened through explicit triangulation across sources, theme-level member checking, reflexive memos, and joint displays that align evidence from observation/TAP/FGD/artifacts for each theme so readers can trace claims back to data (Denzin, 2009). Ethical safeguards included informed consent, confidentiality, and clear positioning of the study as documenting reading experiences rather than evaluating performance.

FINDINGS AND DISCUSSION

Findings

The analysis draws on classroom observations, think-aloud protocols (TAP), focus group discussions (FGD), and student learning artifacts to describe how students constructed meaning at the discourse level while reading complex English texts with the support of ChatGPT-generated summaries. The focus is on process: how students tracked cohesion and coherence, generated inferences, recognized rhetorical structure, and decided when to rely on, question, or verify the summary against the source text.

Four interrelated themes emerged from the analysis: (1) AI summaries as orientation tools, (2) referential tracking and coherence building, (3) inference construction and gap-filling, and (4) critical verification practices. These themes are presented below.

AI Summaries as Orientation Tools

Observation data indicated that students rarely read in a straight, uninterrupted line. Instead, they regulated their reading by shifting attention, slowing down, and revisiting earlier sections when they sensed a break in understanding.



Figure 1. Observation Data Collection Process in Class

Three recurring behaviors were especially visible: cross-text navigation, focused rereading, and reflective pausing. Cross-text navigation appeared when students moved between the printed passage and the ChatGPT-generated summary on their phones. This switching was most visible when students encountered long paragraphs, dense explanations, or sections with shifting viewpoints. Several students used the summary as an initial “map” before returning to the text for detail; others used it mid-reading to check whether they were still aligned with the text’s direction. The switching was not random. It tended to occur at discourse pressure points such as paragraph transitions, claims followed by evidence, and contrast markers (e.g., however, although), suggesting that students were monitoring global meaning while reading.

Focused rereading often targeted pronouns, claims, and contrastive or causal relations. Reflective pauses occurred after information-heavy segments; students stopped briefly, looked back up the paragraph or at the summary, and then resumed with a noticeably slower pace. These pauses appeared to function as integration moments, when students tried to consolidate meaning across sentences and connect what they had just read to what came before.

Table 1. Observed Discourse-Level Reading Behaviors and Likely Function

| Student code | Observation evidence (what was seen) | Recurrent pattern | Likely discourse function |
|--------------|---|----------------------------------|--|
| FJ | Alternated between phone summary and printed text, especially at paragraph shifts | Cross-text navigation | Orienting global meaning before details |
| CA | Highlighted claims/connectors; reread contrast sentences | Focused rereading | Tracking coherence and argument flow |
| RA | Long pauses after dense paragraphs; then reread previous sentences | Reflective pausing + repair | Integrating ideas; restoring coherence |
| VL | Followed text line by line with a pen; paused at discourse markers | Linear tracking with checkpoints | Maintaining continuity; monitoring structure |
| KN | Mouthing words; reread the same paragraph before writing notes | Repetition for confirmation | Consolidating meaning; checking consistency |
| SZ | Compared specific sentences with summary; pointed to matching phrases | Cross-checking | Verifying alignment; selective validation |

| | | | |
|----|---|----------------------|---|
| RS | Slow scrolling; looked back to earlier paragraphs before continuing | Backward search | Linking evidence across paragraphs |
| RP | Reread a segment, then nodded and continued; wrote short keywords | Meaning confirmation | Consolidating macro-idea and key points |

Student codes represent anonymized pseudonyms.

Classroom observations indicated that students were actively monitoring the development of ideas within the text. For most participants, the summary generated by ChatGPT functioned as a guide that prompted comparison, targeted rereading, and consolidation of meaning, rather than serving as a substitute for direct engagement with the original passage.

Referential Tracking and Coherence Building

Think-aloud protocols provided direct evidence of how students constructed meaning in real time.



Figure 2. Think-Aloud Protocol Procedure and Participant Instructions

Pronoun resolution was frequent and deliberate. Students paused to identify the referent of *they*, *this*, or *he*, and often reread earlier sentences to confirm. One student stated, “‘They’ here means the teachers, because the sentence before talks about teachers feeling tired” (FJ).

Another described a similar repair move:

“At first, I was confused who ‘they’ is, but after I reread the sentence before, it refers to the smart student and his friends” (RA).

These utterances show that cohesion tracking was not automatic; students actively worked to maintain referential clarity across sentences.

Coherence building was also evident when students connected ideas across paragraphs. For example, students paused at paragraph transitions and reread contrastive sentences. As one participant explained during FGD, “I try to connect the paragraphs so it’s not separate.” These behaviors indicate deliberate efforts to sustain logical continuity and argument flow.

Table 2. Discourse-Level Processing Evident in TAP (Selected Examples)

| Student code | Verbal utterance (TAP excerpt) | Trigger in text | Discourse process | What it achieves for comprehension |
|--------------|---|------------------------|-----------------------------|---|
| FJ | “‘They’ here means the teachers...” | Personal pronoun | Cohesion: referent tracking | Stabilizes who/what is being discussed |
| RA | “I was confused... after I reread... it refers to...” | Ambiguous they | Repair + cohesion | Resolves breakdown; restores continuity |
| KA | “‘This’... refers to all the situations before...” | Demonstrative this | Inference: bridging | Integrates multiple prior propositions |
| RS | “Because of all these small stories means...” | Multiple episodes | Macro-inference | Compresses details into global meaning |
| CA | “This part is like the conflict...” | Contrasting positions | Rhetorical recognition | Locates argumentative tension and direction |
| VL | “This paragraph is the conclusion...” | Closing paragraph cues | Macrostructure awareness | Confirms overall purpose and closure |

| | | | | |
|----|---|-----------------|------------------|---|
| SZ | "Let me check the summary... then back to the text" | Dense paragraph | Cross-validation | Tests interpretation against another representation |
| RP | "This is the main point..." | Topic sentence | Synthesis | Consolidates gist for recall and continuation |

Inference Construction and Gap-Filling

Inference-building emerged when students linked dispersed pieces of information to form macro-level meaning. Students sometimes treated demonstratives like *this* as umbrella references to earlier situations.

As KA explained,

"'This' does not mean only one thing. It refers to all the situations before, like the teachers being tired and the students being bored."

Similarly, RS stated,

"Because of all these small stories means the problems in class, the phone rules, and the teachers' difficulties."

These excerpts demonstrate bridging and macro-inference processes in which students integrated scattered propositions into a coherent global understanding.

Rhetorical structuring further supported comprehension. Students labeled text segments by functional role.

CA observed,

"This part is like the conflict, because there are different opinions between the principal and the vice principal."

VL added,

"This paragraph is the conclusion, because it talks about balance and summarizes all the problems before."

Such labels indicate awareness of argumentative organization and macrostructure.

Critical Verification Practices

Students' reflections in the FGD revealed that they generally treated the summary as supportive rather than authoritative.



Figure 3. Focus Group Discussion Procedure and Guiding Questions

FGD data showed that students generally treated the summary as support, not as an unquestioned authority. Their reflections highlighted three integration strategies: overview-first mapping, read-then-verify, and selective cross-validation. Students also described how they responded when the summary felt incomplete or mismatched.

In overview-first mapping, students began with the summary to reduce uncertainty and form expectations about the main idea before entering the longer passage. One student said,

"I read the summary first so I already know what the text is about. When I read the long text after that, I'm not confused because I know the main point" (CA).

Another explained,

"The summary helps me see the big picture first, then I read the text to understand the details" (FJ).

These accounts fit what was observed during reading, where students checked the summary at the start and around key transitions.

In read-then-verify, students preferred to read the passage first and consult the summary afterwards to confirm whether their understanding was aligned. This approach tended to appear when students wanted to rely on textual evidence first and only use the summary as a checkpoint. In selective cross-validation, students moved back and forth only for parts that felt important, confusing, or central to the argument.

As SZ described,

"I don't reread everything, only the parts that feel important or confusing."

suggesting a targeted verification pattern rather than full repetition.

Students also reported a cautious stance toward reliability. Several participants felt that summaries could be too short, overly simplified, or missing key points, and this uncertainty triggered return-to-text behaviors.

"Sometimes the summary is too short and I feel like something is missing, so I don't fully trust it" (RS).

Another added,

"If the summary feels different from what I read, I think maybe it's not complete" (VL).

These reflections mirror TAP moments where students compared meanings across sources and repaired understanding by searching for evidence in the passage.

Table 3. Reported Strategies for Integrating ChatGPT-Generated Summaries

| Student code | Reported strategy | Primary purpose | Typical sequence | When it was used |
|--------------|-------------------------------------|---|----------------------------------|---|
| FJ | Overview-first mapping | Orient to topic and main ideas | Summary → Text | Before starting; at major transitions |
| CA | Overview-first + checking | Reduce confusion; keep direction | Summary ↔ Text | When paragraphs felt long/dense |
| RA | Read-then-verify | Confirm interpretation | Text → Summary | After finishing a section |
| VL | Structure mapping | Identify organization (claim-support-closure) | Summary → Text | When tracking argument flow |
| KN | Selective support | Lower cognitive load on difficult parts | Text → Summary → Text | Only at confusing segments |
| SZ | Selective cross-validation | Verify accuracy and details | Text ↔ Summary | When unsure or when answering questions |
| RS | Summary for gist + distrust trigger | Build gist; check omissions | Summary → Text (verify) | When summary felt incomplete |
| RP | Mismatch repair | Correct misunderstanding | Summary → Text (evidence search) | When summary and text didn't align |

Contrasting case: initial overreliance followed by correction

Not all students used the summary in a consistently evidence-based way from the start. One contrasting pattern was an initial tendency to treat the summary as "enough" for answering, followed by correction when the summary did not fully match the source or when the task demanded evidence. In the classroom session, SZ was observed spending longer on the phone summary before returning to the printed passage, and during discussion SZ admitted that the summary was attractive because it made the task feel quicker:

"I don't reread everything, only the parts that feel important or confusing" (SZ).

However, TAP data suggested that once confusion appeared, SZ shifted into verification mode.

SZ verbalized a clear return-to-text move:

"Let me check the summary... then back to the text" (SZ),

indicating a change from shortcut behavior to cross-validation. This case illustrates that overreliance was not a fixed habit; it tended to surface when texts felt heavy or time felt limited, but it could be corrected when students encountered mismatch, uncertainty, or an expectation to justify meaning using the original passage.

Contrasting Case: Initial Overreliance Followed by Correction

One contrasting pattern showed an initial tendency to rely heavily on the summary, followed by correction when discrepancies emerged. During observation, SZ spent longer reading the summary before returning to the printed passage. However, TAP data showed a shift toward verification:

"Let me check the summary... then back to the text" (SZ).

This case suggests that overreliance was situational and could shift toward evidence-based reading when mismatch became apparent.

Converging patterns identified through triangulation

Across sources, the same discourse-level moves tended to appear in different forms: visible behavior (observation), real-time reasoning (TAP), and retrospective justification (FGD). Reflective pauses observed in class often corresponded to TAP moments where students attempted to connect ideas ("this refers to...") or repaired understanding ("I was confused... after I reread..."), and students later described these pauses as efforts to "make it make sense." Similarly, cross-text navigation observed during reading aligned with students' reported strategies of overview-first mapping and selective cross-validation, particularly when they described the summary as a guide for big picture understanding and the text as the place to confirm details.

Table 4. Joint Display of Triangulated Evidence for Key Themes

| Theme | Observation evidence | Think-aloud evidence | FGD evidence | Key quote |
|--|---|--|--|--|
| Overview-first mapping (orientation) | Students opened the summary before reading; checked it at transitions | "So the text is about..." (orientation talk) | "I read the summary first so I already know what the text is about" (CA) | "The summary helps me see the big picture first..." (FJ) |
| Read-then-verify (confirmation) | Students read paragraphs first, then switched to summary | "Let me check if my understanding matches..." (verification talk) | Students described summary as a checkpoint after reading | "I read first, then I used the summary to see if I missed something." (RA) |
| Cohesion tracking (referents/connectors) | Rereading pronouns; scanning upward to find referents | "They' here means the teachers..." (FJ); "I was confused... after I reread..." (RA) | "I check the meaning again when I see 'this/they'" (FGD) | "At first I was confused... after I reread..." (RA) |
| Coherence building (linking ideas) | Pauses at paragraph transitions; reread contrasts | "This is because..." / "it connects to before" (integration talk) | "I try to connect the paragraphs so it's not separate" (FGD) | "This'... refers to all the situations before..." (KA) |
| Inference-making (implied meaning) | Slowed reading at implied contrasts; reread clusters | "It doesn't say directly, but..." (inference talk) | "Sometimes I need to guess from the context" (FGD) | "Because of all these small stories means..." (RS) |
| Rhetorical recognition (macrostructure) | Highlighted claims/connectors; marked endings | "This part is like the conflict..." (CA); "This paragraph is the conclusion..." (VL) | "The summary helps me see the structure" (FGD) | "This paragraph is the conclusion..." (VL) |
| Summary-text integration (verification) | Switching between phone and print; pointing to lines | "Let me check the summary... then back to the text" (SZ) | "If it feels different, I return to the text" (VL); "I | "Sometimes the summary is too short... I don't fully trust it." (RS) |

| | | | | |
|---|---|---|--|---|
| | | | don't fully trust it..." (RS) | |
| Overreliance and correction (variation) | A few students lingered on summary before returning to text | Minimal text evidence until mismatch; shift into checking | "It's tempting because it's shorter" (FGD) | "Let me check the summary... then back to the text." (SZ) |

The converging evidence suggests that ChatGPT-generated summaries most often functioned as digital scaffolds that supported discourse-level comprehension when students treated them as a guide or a hypothesis to verify. Students who actively cross-checked the summary against the text tended to show clearer cohesion tracking, more explicit inference-making, and stronger rhetorical labeling in TAP data. At the same time, the contrasting case illustrates that initial overreliance can occur, particularly when students feel pressed by text length, but that this tendency can shift toward verification once students encounter mismatch or are oriented toward evidence-based reading.

Discussion

The findings suggest that students' success with complex English texts depended less on decoding individual sentences and more on whether they could keep meaning "alive" across clauses, paragraphs, and rhetorical moves. Across classroom observation, TAP, and FGD, comprehension was repeatedly shown as something students built and rebuilt through monitoring and repair, which fits the Construction-Integration Model (Kintsch, 1998). Students did not arrive at coherence automatically; they reached it through small, visible decisions—pausing at ambiguous references, rereading to stabilize who or what a pronoun referred to, and testing interpretations until they felt consistent with surrounding information. This pattern supports the view that comprehension is an interaction between textual input and prior knowledge, where meaning is updated and revised rather than simply received (Smith et al., 2021). It also helps explain why discourse-level breakdowns persisted even when vocabulary was manageable: maintaining coherence across time places demands on working memory and inference resources, so students must actively manage connections to avoid losing the thread (Kim, 2020). In this sense, the "problem" in complex reading was not only linguistic difficulty, but also the cognitive and motivational work required to sustain integration—an argument that resonates with Indonesian-context findings linking comprehension to affective and cognitive correlates and to students' confidence and persistence in reading tasks (Alfiani et al., 2024; Anggia et al., 2023).

At the macro level, the findings also align with van Dijk's (1980) macrostructure theory. Students' rhetorical labeling—identifying conflict, examples, and conclusions—signals emerging sensitivity to global organization rather than treating the text as a sequence of disconnected sentences. Macrostructure theory clarifies why many students can translate accurately but still struggle to explain what a text is doing overall: understanding depends on recognizing how ideas are grouped, prioritized, and directed toward a larger purpose (van Dijk, 1980). In this study, naming rhetorical function often went hand in hand with clearer comprehension because it helped students decide what counted as the main line of the argument and how details served that line. This is especially relevant for argumentative and expository texts commonly used in senior high school, where comprehension requires tracing claim-support relationships and recognizing shifts such as counterargument and resolution. Prior work on Indonesian learners' argumentative organization suggests that managing claim and support systematically can be challenging and may require explicit attention to structure (Dharmawan et al., 2023). The present findings contribute a reading-side counterpart: when students recognized argumentative roles while reading, they were better positioned to connect evidence to claims and maintain coherence across paragraphs rather than getting stuck at sentence-level meaning.

A key implication is that students' difficulties were not purely linguistic. The data point to a discourse-level bottleneck: even when students could read sentences, they struggled to connect paragraph-to-paragraph meaning, resolve what demonstratives summarized, or follow how a text moved from problem to reasoning to conclusion. This complements EFL

reading studies that emphasize vocabulary and fluency barriers (Hezam et al., 2022; Kim & Lee, 2024), but it also extends them by showing what students do at the moment comprehension starts to slip. Students' behaviors and talk indicate that discourse-level awareness is strategic and teachable rather than something that appears only after vocabulary mastery. When students were oriented toward checking coherence, they became more attentive to referential chains, paragraph functions, and transition logic, echoing research that frames comprehension as a strategic interaction with text (Stevani et al., 2022; Smith et al., 2021). This also helps explain the "shortcut drift" observed in many classrooms: when confidence is low, students may stop trying to integrate meaning and instead prioritize finishing the task, relying on translation or external tools to reduce effort (Anggia et al., 2023).

Within that landscape, ChatGPT-generated summaries functioned primarily as mediational supports rather than replacements for the original text. Students used the summaries to (1) get an initial orientation (overview-first mapping), (2) confirm or repair understanding after reading (read-then-verify), and (3) selectively cross-check confusing or central parts (cross-validation). This supports the digital scaffolding literature, which suggests that tools are most educationally valuable when they support deeper comprehension and autonomy rather than merely delivering answers (Chen, 2020; Chen, 2021). Importantly, these patterns show that "using ChatGPT" is not a single behavior. Students made integration choices that shaped the quality of their discourse processing. When the summary was treated as a guide to test, it often became a cognitive anchor that reduced overwhelm and helped students persist, while still pushing them back to the text for evidence. This is especially important given prior findings that ChatGPT can generate coherent summaries but may also produce omissions or inconsistencies relative to the source (Pu & Demberg, 2023; Yang et al., 2023). In this study, verification practices turned that risk into a learning mechanism: mismatch or uncertainty triggered return-to-text moves, prompting students to locate evidence, resolve referents, and justify interpretations—behaviors that are central to discourse-level comprehension.

At the same time, the findings also show why instructional framing matters. Small instances of overreliance occurred when students were drawn to the summary's brevity, a pattern consistent with warnings that digital supports can become shortcut devices if learners are not guided to use them as thinking tools (Chen, 2020; Liu et al., 2022; Chairinkam & Yawiloeng, 2024). The more important observation, however, is that overreliance was not stable: it often shifted toward verification when students encountered mismatch, confusion, or expectations to justify answers from the text. That shift reflects emerging metacognitive awareness, where students monitored not only comprehension but also tool trustworthiness and their own decision-making. This connects to evidence that engagement and enjoyment influence persistence in complex language tasks (Hidayati et al., 2024) and that self-efficacy shapes whether students stay in the task long enough to build coherence (Anggia et al., 2023). In practical terms, the summary appeared to lower the entry barrier to dense texts, while verification norms protected critical engagement.

From a sociocultural perspective, these patterns can be interpreted as digital scaffolding within students' Zone of Proximal Development (Vygotsky, 1978). The summary acted as a mediated tool that helped students coordinate attention, reduce cognitive load at key pressure points, and sustain direction in longer texts. Crucially, the scaffolding was dynamic. Many students moved between summary and source text rather than remaining dependent on the summary alone, suggesting that support was being used to construct understanding rather than to outsource it. This aligns with Vygotsky's view that tools and interaction can enable learners to perform beyond their current independent level, with the goal of internalizing strategies over time (Vygotsky, 1978). It also reflects a broader sociocultural point: what students do with tools depends on classroom norms and what they believe counts as legitimate reading practice. When verification and evidence-searching are positioned as expected behaviors, students are more likely to treat summaries as provisional supports rather than authoritative substitutes (Cahyanti & Dharmawan, 2025).

The main novelty and broader contribution of this study is its process-level account of how generative AI can support discourse comprehension without collapsing critical reading. Instead of treating ChatGPT as either a solution or a threat, the findings point to a more actionable claim: ChatGPT-generated summaries become educationally valuable when students learn integration routines—overview-first mapping, read-then-verify, selective cross-validation, and overreliance-correction—and when verification against textual evidence is built into the activity. This directly addresses a gap in research that often emphasizes outcomes, perceptions, or technical summary quality rather than the lived mechanics of meaning construction in authentic classrooms (Chen, 2021; Liu et al., 2022). It also extends discourse-level reading theory by showing how cohesion tracking, inference-making, and rhetorical recognition can be supported through mediated tools while preserving learner agency (Kintsch, 1998; Van Dijk, 1980).

The implications of this study extend beyond the immediate setting. EFL classrooms in many parts of the world encounter a similar challenge: students are required to work with academically demanding texts, while teachers often lack sufficient time to provide individualized guidance. When presented as propositions to be examined rather than conclusions to be accepted, ChatGPT-generated summaries can serve as a scalable support mechanism that helps learners stay oriented, persist through difficulty, and build connections across ideas. At the same time, this approach fosters a transferable disposition toward critical reading. In an era where texts may appear polished yet lack reliability, equipping students to question, integrate, and verify information may be just as crucial as developing their comprehension skills.

CONCLUSIONS

This qualitative case study examined how Grade XI EFL students constructed discourse-level meaning while reading complex English texts with the support of ChatGPT-generated summaries. Drawing on converging evidence from classroom observations, think-aloud protocols, focus group discussions, and artifacts, the findings show that comprehension unfolded through active monitoring and repair rather than passive decoding. Students navigated strategically between summary and source text, reread selectively, paused to consolidate meaning, and verbalized cohesion tracking, coherence building, inference-making, and rhetorical recognition in ways consistent with the Construction-Integration Model and macrostructure theory (Kintsch, 1998; Van Dijk, 1980). Three key contributions emerge: AI-generated summaries functioned as provisional scaffolds rather than fixed answers; students developed critical verification routines such as overview-first mapping, read-then-verify, and selective cross-validation; and AI support did not replace reading but instead enhanced discourse-level processing by prompting textual comparison and evidence-based interpretation (Pu & Demberg, 2023; Yang et al., 2023). From a theoretical perspective, the study extends sociocultural theory into AI-mediated literacy by showing how generative AI can operate as a form of mediated support within students' Zone of Proximal Development (Vygotsky, 1978; Chen, 2020; Chen, 2021). Rather than functioning as an answer machine, ChatGPT-generated summaries acted as dialogic partners in the reading process, inviting negotiation, verification, and refinement of meaning. The study shifts the focus from whether students use ChatGPT to how they integrate it, suggesting that when framed as hypotheses to test rather than authoritative substitutes, AI summaries can support academic literacy while preserving critical engagement with the original text.

REFERENCES

- Abdollahi-Guilani, M. (2022). Readability index and reading complexity in high school EFL textbooks. *Foreign Language Research Journal*, 12(2), 37–59.
- Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. *Contemporary Educational Technology*, 15(3). <https://doi.org/10.30935/cedtech/13152>

- Alfiani, E., Anggia, H., Harpain, H., Dharmawan, Y. Y., Sidabalok, D. M., & Lakatos, K. (2024). Affective and cognitive correlates of reading comprehension: a structural analysis. *JEES (Journal of English Educators Society)*, 9(2), 144–153. <https://doi.org/10.21070/jees.v9i2.1900>
- Anggia, H., Dharmawan, Y. Y., Cucus, A., & Deviyanti, R. (2023). Student's reading self-efficacy regression model and differences in online extensive reading program. *AIP Conference Proceedings*, 2621(1), 040004. <https://doi.org/10.1063/5.0142284>
- Braun, V., & Clarke, V. (2023). Toward good practice in thematic analysis : Avoiding common problems and be (com) ing a knowing researcher. *International Journal of Transgender Health.*, 24(1), 1–6. <https://doi.org/10.1080/26895269.2022.2129597>
- Braun, V., & Clarke, V. (2024). Supporting best practice in reflexive thematic analysis reporting in Palliative Medicine: A review of published research and introduction to the Reflexive Thematic Analysis Reporting Guidelines (RTARG). *Palliative Medicine*, 38(6), 608–616. <https://doi.org/10.1177/02692163241234800>
- Cahyanti, A. D., & Dharmawan, Y. Y. (2025). Reframing EFL classrooms students' perspectives on translanguaging as a pedagogical strategy in Indonesian senior high school. *Indonesian Journal of Teaching and Learning (INTEL)*, 4(3), 197–206. <https://doi.org/10.56855/intel.v4i3.1673>
- Castillo-Montoya, M. (2016). Protocolo Para La Guía De Entrevista. *Qualitative Report*, 21(5), 811–831.
- Chairinkam, J., & Yawiloeng, R. (2024). The use of scaffolding strategies to enhance the writing development of EFL students. *Theory and Practice in Language Studies*, 14(9), 2996–3007. <https://doi.org/10.17507/tpls.1409.35>
- Chen, C. (2020). Using digital scaffolding materials to enhance learners' autonomous learning: A case in a chinese university. *Academic Journal of Humanities & Social Sciences*, 3(8), 82–96. <https://doi.org/10.25236/AJHSS.2020.030808>
- Chen, C. (2021). Using scaffolding materials to facilitate autonomous online chinese as a foreign language learning: A study during the COVID-19 pandemic. *SAGE Open*, 1–12. <https://doi.org/10.1177/21582440211040131>
- Dharmawan, Y. Y., Ali, H. V., Prasaty, B. A., & Amaliah, A. (2023). Comparing The Argumentative Essay Formats of Indonesian and Korean Students Using the Toulmin Model. *Jurnal Onoma: Pendidikan, Bahasa, Dan Sastra*, 9(2), 1099–1114. <https://doi.org/https://doi.org/10.30605/onoma.v9i2.2922>
- Erbas, C., Ture, E., & Sapanca, H. F. (2025). Exploring meaning-making in instructional technology: A phenomenological study of english language teaching students. In *Education and Information Technologies* (Vol. 30, Issue 12). Springer US. <https://doi.org/10.1007/s10639-025-13450-7>
- Herawati, I., & Istinganah, E. L. (2024). The students' perception of English as global language. *Metafora : Jurnal Pembelajaran Bahasa Dan Sastra*, 11(1), 254–258. <https://doi.org/10.30595/mtf.v11i1.24473>
- Hezam, T. A., Ali, J. K. M., Imtiaz, S., Saifi, M. A., & Rezaul Islam, M. (2022). Challenges and problems of reading comprehension experienced by EFL learners. *Journal of English Studies in Arabia Felix*, 1(2), 11–21. <https://doi.org/10.56540/jesaf.v1i2.28>
- Hidayat, M. T. (2024). English language proficiency and career opportunities: Perceptions of Indonesian University Graduates. *Language Value*, 17(1), 85–107. <https://doi.org/10.6035/languagev.7933>
- Hidayati, D., Dharmawan, Y. Y., Prasaty, B. A., & Luciana, L. (2024). Exploring how translanguaging and multimodal learning improve EFL students' enjoyment and proficiency. *Journal on English as a Foreign Language*, 14(2), 446–475. <https://doi.org/10.23971/jefl.v14i2.8012>
- Kim, E. J., & Lee, B. (2024). Bridging the gap : Analyzing english reading proficiency disparities among korean efl learners different perspectives on reading. *Research Square*, 1–16.

- Kim, Y.-S. G. (2020). Interactive dynamic literacy model: An integrative theoretical framework for reading and writing relations. *Reading-Writing Connections: Towards Integrative Literacy Science*, 1–23. <https://doi.org/10.1007/978-3-030-38811->
- Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge University Press.
- Leighton, J. P. (2024). Freedom to think aloud. *Frontiers in Education*, 9, 1–4. <https://doi.org/10.3389/feduc.2024.1518075>
- Liu, Z., Hua, J., & Zhang, Z. (2022). Scaffolding instruction in virtual language learning. *Journal of Language Teaching and Research*, 13(2), 386–391. <https://doi.org/10.17507/jltr.1302.20>
- Nurmalasari, N., & Haryudin, A. (2021). The students' difficulties in learning reading. *PROJECT (Professional Journal of English Education)*, 4(1), 29–34. <https://doi.org/10.22460/project.v4i1.p29-34>
- Pu, D., & Demberg, V. (2023). ChatGPT vs Human-authored text: Insights into controllable text summarization and sentence style transfer. *Proceedings of the Annual Meeting of the Association for Computational Linguistics*, 1–18. <https://doi.org/10.18653/v1/2023.acl-srw.1>
- Puspitasari, E., & AUFAR, A. (2021). A phenomenological exploration of EFL students' experiences with graded readers. *Proceedings of the 4th International Conference on Sustainable Innovation 2020 - Social, Humanity, and Education*, 518, 412–418. <https://doi.org/10.2991/assehr.k.210120.154>
- Ramadianti, A., & Somba, S. (2023). Reading comprehension difficulties in Indonesian EFL students. *Journal of English Language Teaching and Learning (JELTL)*, 6(1), 1–11.
- Smith, R., Snow, P., Serry, T., & Hammond, L. (2021). The role of background knowledge in reading comprehension: A critical review. *Reading Psychology*, 42(3), 214–240. <https://doi.org/10.1080/02702711.2021.1888348>
- Stevani, M., Prayuda, M. S., Sari, D. W., Marianus, S. M., & Tarigan, K. E. (2022). Evaluation of contextual clues: EFL proficiency in reading comprehension. *English Review: Journal of English Education*, 10(3), 993–1002. <https://doi.org/10.25134/erjee.v10i3.7076>
- Van Dijk, T. A. (1980). Macrostructures: An interdisciplinary study of global structures in discourse, interaction, and cognition. In *Lawrence Erlbaum Associates, Inc.*
- Vázquez-Cano, E., Ramírez-Hurtado, J. M., Sáez-López, J. M., & López-Meneses, E. (2023). ChatGPT: The brightest student in the class. *Thinking Skills and Creativity*, 49, 1–12. <https://doi.org/10.1016/j.tsc.2023.101380>
- Vygotsky, L. S. (1978). *Mind in Society: The development of higher psychological processes*. Harvard University Press.
- Wen, J., & Wang, W. (2023). The future of ChatGPT in academic research and publishing: A commentary for clinical and translational medicine. *Clinical and Translational Medicine*, 13, 1–3. <https://doi.org/10.1002/ctm2.1207>
- Wirth, L., Kuhl, P., & Ehmke, T. (2022). Relationships between language-related variations in text tasks, reading comprehension, and students' motivation and emotions: A systematic Review. *Journal of Language and Education*, 8(2), 181–194. <https://doi.org/10.17323/jle.2022.13572>
- Wolcott, M. D., & Lobczowski, N. G. (2021). Using cognitive interviews and think-aloud protocols to understand thought processes. *Currents in Pharmacy Teaching and Learning*, 13(2), 181–188. <https://doi.org/10.1016/j.cptl.2020.09.005>
- Yang, X., Li, Y., Zhang, X., Chen, H., & Cheng, W. (2023). *Exploring the Limits of ChatGPT for Query or Aspect-based Text Summarization*.
- Zhang, H. (2023). The impact of English language development on internationalization of education. *Proceedings of the 2nd International Conference on Interdisciplinary Humanities and Communication Studies*, 34(1), 243–249. <https://doi.org/10.54254/2753-7048/34/20231933>