Efficacy of Inquiry-Based Learning Teaching Approach in EFL Inferential Reading Comprehension among Chinese High School Students

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Abstract
Chinese EFL high school teaching often overlooks critical inferential reasoning in reading comprehension. This study proposes a shift from teacher-centric methods to an Inquiry-Based Learning Teaching (IBLT) framework, expected to enhance EFL inferential reading abilities among Chinese high school students. This approach aligns with China's National English Curriculum Standards, emphasizing the importance of such proficiency. The study gauges current EFL reading comprehension in Chinese high schools and assesses IBLT's efficacy through a controlled, nine-week experiment, with data analysis revealing a positive impact. The findings aim to inform pedagogical tactics, promoting a more interactive, student-focused teaching model.

Keywords: EFL; Inferential Reading Comprehension Skills; Chinese High School Students; IBLT Approach

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1.0 Introduction
English inferential reading comprehension is vital for learning English. It involves interpreting implicit meanings in context, demanding active engagement and higher cognitive skills (Lee, 2023; Kirmizi, 2010). The 2017 High School English Curriculum Standard emphasizes this and encourages instructional models rooted in discourse linguistic theory (Shi, 2021; Guan, 2022). However, current Chinese high school teaching often prioritizes passive learning, hampering EFL inferential reading skills' development (Chen, 2021; Wang, 2022). This results in shallow text understanding and impedes higher-order thinking (Yang, 2019; Li, 2022). Inquiry-Based Learning Teaching (IBLT) offers a solution by promoting active engagement and deeper subject understanding (Yang & Hu, 2019; Zhang et al., 2020). IBLT effectively improves reading comprehension, enhances student engagement and motivation (Abdullah, 2014; Adege, 2016), and mitigates traditional teaching limitations (Ma, 2021; Cui, 2022).

1.1 Statement of Problem
English language proficiency, particularly reading comprehension, is intricately linked to a student's linguistic competence (Xu & Jin, 2020; Wu, 2018). Robust inferential reasoning is essential for understanding written discourse accurately, as misinterpretations are common without it (Chen, 2022; Yang, 2019). Unfortunately, prevailing Chinese high school pedagogical strategies for EFL inferential
reading fail to address the nuanced complexities of higher-level comprehension (Xu & Jin, 2020). These methods, often teacher-centric, encourage passive learning and rote memorization, neglecting critical thinking for successful inferential comprehension (Luo, 2021; Guo, 2021). This approach hampers students’ cognitive development, limiting their capacity to independently analyze, evaluate, and interpret texts (Chen & Li, 2021; Wang et al., 2023). As a result, students often struggle with grasping implicit meanings and making coherent inferences, impairing their EFL inferential reading comprehension (Ma, 2021; Du et al., 2022). This method highlights the pressing need to explore more effective pedagogical strategies to promote reading comprehension skills, particularly inferential abilities, essential for deriving more profound insights from textual material (Liu, 2021; Huang, 2019).

1.2 Objective of the Study
This study examines the efficacy of the IBLT approach on Chinese high school students’ EFL inferential reading comprehension. Employing a quantitative method, it tracks performance changes before and after IBLT implementation in EFL inferential reading comprehension classrooms. The findings, highlighting the IBLT efficacy of IBLT, will guide future research to bolster EFL inferential reading comprehension. For this purpose, the research objectives include:

RO1: Evaluate the current proficiency level of Chinese high school students in EFL inferential reading comprehension.
RO2: Investigate the effectiveness of the Inquiry-Based Learning Teaching approach in improving EFL inferential reading comprehension skills among Chinese high school students.

2.0 Literature Review
This part critically examines the crucial role of EFL inferential reading comprehension skills in EFL reading learning and the limitations of conventional teaching methods in EFL inferential instruction. It highlights the IBLT approach as a potential solution and identifies a gap in the literature exploring its impact on EFL inferential reading comprehension among Chinese high school students.

2.1 Reading Comprehension in EFL Learning
Reading comprehension is vital to EFL learning, requiring cognitive processes beyond word recognition (Hilsdon, 2010; Liu, 2016). It involves interpreting and critically analyzing an author’s message, significantly enhancing language competency (Kintsch, 1998). Proficient reading skills are well-documented to improve EFL proficiency, underscoring their essential role in EFL learning (Hudson, 2007; Zhang, 2018). These multifaceted skills involve a complex cognitive interplay, highlighting their significance in comprehending written texts in English as a foreign language.

2.2 EFL Inferential Reading Comprehension Skills
In the context of EFL reading learning, inferential reading comprehension skills take on amplified importance. These higher-level cognitive skills empower learners to make deductions and comprehend meanings not explicitly stated in the text, thereby enriching their understanding of the EFL language and culture (Cao & Yao, 2019; Chen, 2022). EFL inferential reading comprehension requires learners to forge connections actively, use prior knowledge, and deploy their inferential abilities to uncover underlying meanings, providing a comprehensive understanding of the text.

2.3 Traditional EFL Reading Teaching Methods in China and Their Limitations
EFL reading instruction in China is traditionally teacher-centred, prioritizing passive knowledge absorption, rote memorization, and drills for language basics (Hong, 2019; Luo, 2020). While beneficial in some aspects, these methods often neglect essential inferential reading skills due to their lack of emphasis on active engagement and critical thinking (Chen, 2021; Wang, 2020). This gap can hinder students’ independent text analysis and interpretation capacity, impeding their EFL reading progress.

2.4 IBLT Approach
In contrast to traditional teacher-centric methods, the IBLT approach encourages active engagement in problem-solving and cultivates a sense of autonomy in learners. IBLT is rooted in the philosophy that knowledge should not be passively received but actively constructed, positioning students as the central agents in the learning process (Facione, 2011; Hilsdon, 2010). IBLT cultivates an environment that stimulates curiosity, encourages inquiry, and promotes exploration, fostering a deep understanding of the text and nurturing EFL critical inferential reading comprehension skills (Buranapatana, 2006; Facione, 2015).

2.5 IBLT in the EFL Reading Comprehension Instruction in China
The potential benefits of IBLT have sparked interest among educators and researchers in China, leading to a gradual incorporation of this approach into EFL classrooms. Nevertheless, comprehensive empirical studies examining the effectiveness of IBLT in fostering EFL inferential reading comprehension skills among Chinese high school students still need to be explored (Qiu, 2019; Luo, 2020). Preliminary research hints at the potential benefits of the IBLT approach, suggesting it could enhance reading comprehension performance and increase students’ motivation and engagement in the learning process (Lee, 2014; Martinee & Duncan, 2015; Liu, 2022).

2.6 Gap in Literature
The IBLT approach is emerging, but empirical studies on its impact on EFL inferential reading among Chinese high students are lacking. Addressing this can guide EFL teaching advancements in China. This review emphasizes the need for innovative methods like IBLT, prompting this study's aim to evaluate its effectiveness.

3.0 Methodology
This section outlines the research design, participants, instruments, procedures, data collection, and analysis techniques utilized in this study to address the research objectives. The research employs a quantitative method to investigate and analyze the identified research questions systematically.

3.1 Participants
98 Chinese high school students participated in the study, with 49 students assigned to the control group and 49 to the experimental group. The participants, aged between 16 and 17, had similar initial English proficiency levels. Ethical protocols were strictly followed, including acquiring informed consent from all participants and safeguarding their anonymity and confidentiality during the research process.

3.2 Justification for the Research Method
This section outlines the research design, participants, instruments, procedures, data collection, and analysis techniques to address the research objectives. The research employs a quantitative method to investigate and analyze the identified research questions systematically.

3.3 Instruments
Employing an EFL inferential reading test and self-perception questionnaire, the author assessed IBLT impact by comparing pre-and post-intervention results. The test evaluated EFL inferential reading skills changes, while the questionnaire tracked self-evaluated skills, gauging IBLT approach efficacy.

3.4 Procedure
The research spanned nine weeks, divided into three distinct phases. The initial phase involved both groups completing a pretest and questionnaire to establish baseline EFL inferential reading abilities. Subsequently, the experimental group underwent IBLT instruction, while the control group followed conventional methods. Following the intervention, both groups experienced a post-test and a follow-up questionnaire. A comparative analysis of the results was performed to evaluate the effects of the intervention.

3.5 Validity and Reliability
The student questionnaire demonstrated exceptional reliability with a Cronbach's Alpha coefficient 0.962, exceeding the 0.9 threshold. Construct validity was assessed using exploratory factor analysis (EFA), with a KMO value over 0.9 and Bartlett's test significance value of 0.000, well below 0.01. Components analyzed included B, C, D, E, F, G, and H. All questions were sourced from the Sichuan National University Entrance Examination's integrated reading sections from 2021 to 2023 to ensure test validity.

3.6 Data Collection
Over nine weeks, both groups received a pretest measuring EFL inferential reading skills and self-perceived competencies. The experimental group experienced IBLT-based instruction, while the control group used traditional methods. Post-intervention, a posttest and a second questionnaire were administered to both groups to assess changes in skills and perceptions.

3.7 Data Analysis
Quantitative data from tests and questionnaires were analyzed using paired-sample t-tests to evaluate EFL inferential reading skills changes. Questionnaire responses gauged self-perceived skill shifts—Independent t-tests compared groups, measuring IBLT's effectiveness against traditional methods among Chinese high students.

4.0 Findings
This section presents the demographic details of the study participants. Subsequently, the results from the data analysis are detailed in line with the set of research objectives.

4.1 Respondents' Demographic Profile
The demographic characteristics of the study include gender, duration of EFL learning, final EFL exam results, and distribution of English scores among students. The sample comprised of 49 students each in the experimental and control groups, amounting to a total of 98 students. Refer to Table 1 for specifics.
The two comprehension pre-reading comprehension among Chinese high school students studying EFL. Table 4 outlines the results derived from the reading scores were within the 3 to 3.4 range, this suggests a slightly below average, scores between 3 and 3.75 as slightly below average, and scores above 3.75 as commendable (Thahira, 2023). Given that the average age yielding a non-significant t-value of 0.137. This trend of non-significant differences across variables (p > 0.05) suggests similar pre-test questionnaire scores between the groups. Our Likert 5-point scale questionnaire categorized scores below three as indicative of poor EFL inferential reading comprehension, scores between 3 and 3.75 as slightly below average, and scores above 3.75 as commendable (Thahira, 2023). Given that the average scores were within the 3 to 3.4 range, this suggests a slightly below-average proficiency in EFL inferential reading comprehension among the students surveyed.

The reading comprehension tests were utilized to provide a more nuanced assessment of the existing competency level in inferential reading comprehension among Chinese high school students studying EFL. Table 4 outlines the results derived from the reading comprehension pre-test.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Value</th>
<th>Sample Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>P</th>
<th>Difference in Means</th>
<th>Cohen's d Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scores</td>
<td>EC</td>
<td>49</td>
<td>15.7</td>
<td>5.007</td>
<td>-0.172</td>
<td>0.864</td>
<td>0.18</td>
<td>0.034</td>
</tr>
</tbody>
</table>
Presented in Table 4 is an independent t-test analysis contrasting the mean scores of the pretests in the experimental class (EC) and control class (CC), each consisting of 49 students. The EC achieved a mean score of 15.7 (SD = 5.007), while the CC attained a mean score of 15.88 (SD = 5.462). The obtained t-value of -0.172, coupled with a p-value of 0.864, signifies the absence of a noteworthy disparity between the groups. This outcome implies a limited level of inferential reading among the students.

4.3 Efficacy of the IBLT Approach in Enhancing EFL Inferential Reading Comprehension Skills among Chinese High School Students

This study analyzed data collected through pre- and post-intervention questionnaires and reading tests to assess the efficacy of the IBLT approach in improving students' EFL inferential reading comprehension skills. The ensuing section presents the outcomes obtained from the students' reading tests:

4.3.1 The Result from EFL Inferential Reading Comprehension Tests

Table 5 presents the post-reading test results from the 98 participants divided equally between the EC and CC.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Sample Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>P</th>
<th>Difference in Means</th>
<th>Cohen's d Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test</td>
<td>49</td>
<td>15.88</td>
<td>5.472</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Test</td>
<td>49</td>
<td>19.837</td>
<td>4.67</td>
<td>2.268</td>
<td>0.026**</td>
<td>2.327</td>
<td>0.458</td>
</tr>
</tbody>
</table>

The preceding table reveals the outcomes of an independent t-test, indicating an average score of 19.837 for the EC and 16.51 for the CC. This table yields a t-value of 2.268 and a p-value of 0.026, demonstrating a statistically noteworthy contrast between the two groups. Consequently, the EC exhibited superior EFL inferential reading skills compared to the CC, substantiating the efficacy of the IBLT approach.

Table 6 displays the results of a paired sample t-test conducted to compare pre-and post-test EFL inferential reading comprehension scores within the EC.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Sample Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>P</th>
<th>Difference in Means</th>
<th>Cohen's d Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-test</td>
<td>49</td>
<td>19.837</td>
<td>4.67</td>
<td>4.249</td>
<td>0.000***</td>
<td>4.137</td>
<td>0.854</td>
</tr>
</tbody>
</table>

The initial test yielded an average of 15.7 (SD=5.007), whereas the subsequent assessment yielded an average of 19.837 (SD=4.67). The paired t-test exposed a t-value of 4.249, with p<0.001, signifying a considerable score disparity. Cohen's d was computed as 0.854, indicating a medium-large effect size. The results underscore the intervention’s success in improving EFL inferential reading comprehension. Detailed paired statistics for the pretest and posttest in the CC are illustrated in Table 7.

Table 7 The paired sample t-test of reading scores between the reading pretest and post-test in CC

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Sample Size</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>P</th>
<th>Difference in Means</th>
<th>Cohen's d Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>49</td>
<td>15.88</td>
<td>5.472</td>
<td>1.484</td>
<td>0.141</td>
<td>1.63</td>
<td>0.298</td>
</tr>
<tr>
<td>Post-test</td>
<td>49</td>
<td>16.51</td>
<td>4.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The CC’s post-test showed a minor rise from 15.88 to 16.51, which wasn’t statistically significant (p=0.141). Traditional teaching had a limited impact on inferential reading comprehension. The result highlights IBLT’s effectiveness.

4.3.2 The Result from Students’ Questionnaire

Table 8 displays the paired test results for the EC, demonstrating significant progress across all dimensions of EFL inferential reading comprehension from pre- to post-questionnaire.

<table>
<thead>
<tr>
<th>Paired t test</th>
<th>Items</th>
<th>Paired (M±SD)</th>
<th>Mean difference(Paired1-Paired2)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Paired1</td>
<td>Paired2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td></td>
<td>3.378</td>
<td>4.131</td>
<td>-4.061</td>
<td>-5.077</td>
</tr>
<tr>
<td>Pre</td>
<td></td>
<td>3.278</td>
<td>3.911</td>
<td>-0.633</td>
<td>-4.543</td>
</tr>
<tr>
<td>Pre</td>
<td></td>
<td>3.500</td>
<td>3.951</td>
<td>-0.451</td>
<td>-3.108</td>
</tr>
</tbody>
</table>
Initial proficiency was assessed via a pre-test, revealing room for improvement. The experimental group received IBLT-based instruction, significantly improving their inferential reading skills (Li, 2021). These results call for a reevaluation of traditional methods. Evidence strongly supports IBLT for bolstering EFL inferential reading skills (Li, 2021).

5.0 Discussion

5.1 The Current Overall Proficiency Level of Students’ EFL Inferential Reading Comprehension Skills

The questionnaire results hint at slightly below-average inferential reading comprehension skills, with mean scores ranging from 3.278 to 3.500 on a 5-point scale (Thahira Bibi TKM Thangal, 2023). These scores suggest a lower level of comprehension, highlighting the need for improvement. Concurrently, the reading comprehension pretest supports this conclusion with a total score of 40 points. The EC and CC achieved average scores of 15.7 and 15.88, respectively, underlining a similar proficiency level in reading comprehension. 

5.2 The Effectiveness of IBLT Approach in Enhancing Students’ EFL Inferential Reading Comprehension Skills

IBLT significantly enhances Chinese high school students’ EFL inferential reading comprehension, outperforming traditional methods and corroborating Hua (2019) and Ma (2021). Unlike conventional methods, IBLT improves various reading comprehension areas, as seen in Shi (2021). These results call for a reevaluation of traditional methods. Evidence strongly supports IBLT for bolstering EFL inferential reading skills (Li, 2021).

6.0 Conclusion & Recommendations

Table 9 depicts paired test results on pre- and post-questionnaires within the CC, assessing EFL inferential reading comprehension dimension changes. For literal reading comprehension, a marginal mean difference of 0.084 emerged between pre- (3.516) and post-questionnaire (3.339) scores, supported by a non-significant p-value (0.576). Comparable marginal changes were evident across dimensions.

5.0 Discussion

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In summary, the current proficiency level of Chinese high school students in EFL inferential reading comprehension is slightly below average. These findings are consistent with previous research by Huang (2019), Liu (2021), and Luo (2021). This discovery underscores the importance of enhancing these crucial EFL inferential reading comprehension skills.

5.2 The Effectiveness of IBLT Approach in Enhancing Students’ EFL Inferential Reading Comprehension Skills

IBLT significantly enhances Chinese high school students’ EFL inferential reading comprehension, outperforming traditional methods and corroborating Hua (2019) and Ma (2021). Unlike conventional methods, IBLT improves various reading comprehension areas, as seen in Shi (2021). These results call for a reevaluation of traditional methods. Evidence strongly supports IBLT for bolstering EFL inferential reading skills (Li, 2021).

6.0 Conclusion & Recommendations

This study explored Chinese high school students’ EFL inferential reading comprehension and the effectiveness of the IBLT approach. Initial proficiency was assessed via a pre-test, revealing room for improvement. The experimental group received IBLT-based instruction,
compared with a control group using traditional methods. Results emphasize IBLT's benefits, reflecting improved inferential reading comprehension.

Given these positive outcomes, schools should consider IBLT for EFL inferential reading instruction, with teacher training facilitating its implementation. Ongoing monitoring and assessments can provide valuable feedback for strategy refinement. IBLT is a promising method to enhance EFL inferential reading comprehension, warranting more comprehensive application and further research.

This study offers valuable insights into Chinese high school students' EFL inferential reading proficiency and the potential benefits of the IBLT approach. Nevertheless, limitations include the preliminary status, a small sample size affecting generalizability, and the quantitative approach potentially limiting the findings' depth and breadth.

7.0 Suggestion for Future Research
Future research could employ a more extensive and diverse sample across multiple schools to enhance the generalizability of findings. A mixed-methods approach integrating qualitative analysis could also enrich insights. A long-term study could further elucidate the sustained effects of IBLT on students' EFL inferential reading proficiency.

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Paper Contribution to Related Field of Study
This study offers empirical support for the IBLT method, providing profound insights into EFL reading education and research.

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