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# Developing Students' Critical Thinking through AI-Enhanced Foreign Language Instruction

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**Abstract**
This study examines the role of artificial intelligence-generated content in foreign language instruction as a means of developing undergraduate students' critical thinking skills. It aims to evaluate teaching strategies that encourage learners to analyze, revise, and reflect on digital texts. Earlier studies often treated artificial intelligence tools as merely a supportive aid; here, they are positioned as a source for critique. The authors exploited a quasi-experimental mixed-methods design. The pedagogical experiment involved 64 first- and second-year students from intact classes at Ternopil Volodymyr Hnatiuk National Pedagogical University in Ukraine. Participants were selected through convenience sampling from intact classes, with one class serving as the experimental group and another as the control. The experimental group received instruction based on the proposed model, while the control group followed a traditional curriculum. Data were collected through pre- and post-tests using the California Critical Thinking Skills Test (CCTST), surveys, and classroom observations, and analyzed both quantitatively and qualitatively. Findings revealed that students in the experimental group demonstrated enhanced critical thinking skills, including the ability to question digital outputs, improved metacognitive awareness, and increased use of evidence-based reasoning. The study presents a pedagogical model that integrates technology with critical thinking objectives, promoting learner autonomy, digital literacy, and curriculum improvement. Future investigations should extend this model across disciplines and proficiency levels.

*Keywords*: AI-generated content, undergraduate students, critical thinking development, Foreign Language Instruction, digital literacy, pedagogical model
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## Introduction

In today's world of rapid technological advancements and global information exchange, the development of students' critical thinking skills has become a central challenge in education. Students are constantly exposed to digital information, yet many accept it without verifying its accuracy. In our teaching practice, we have observed that students often rely on Artificial Intelligence (AI) tools (such as ChatGPT, DeepL, and Google Translate) to complete their assignments, but rarely evaluate the received outputs for accuracy, coherence, bias, or cultural appropriateness. These tools are convenient and efficient in completing tasks, but their unchecked reliance raises concerns about academic integrity and highlights the need for structured approaches that train students to analyze and reflect on digital texts.

Critical thinking is widely recognized as a vital skill for personal growth, professional success, and civic engagement. Scholars such as Liu (2020) emphasize its role in supporting democratic values. International frameworks, including the Common European Framework of Reference for Languages and UNESCO's 2030 Agenda for Sustainable Development, state the need to prepare learners for complex, multilingual, and digital environments. Employers recognize the importance of critical thinking, as it involves sound decision-making, problem-solving, and adaptability in dynamic work settings (Deming, 2021; Favero et al., 2024). Therefore, critical thinking is crucial for both academic achievement and responsible citizenship in society.

Foreign language instruction offers an ideal environment for developing critical thinking skills. Students learn to interpret the meaning of vocabulary across languages, consider cultural perspectives, and engage in dialogues. Previous studies have shown that task-based and project-based learning can foster analytical skills. Most of them, however, have viewed digital tools as supportive aids. Few have examined AI-generated outputs as material for critique and evaluation.

This study addresses this gap. It explores how integrating machine-generated content into foreign language instruction can enhance students' questioning, evaluation, and reasoning skills. The aim is not just to use technology to assess its effectiveness in learning, but to integrate technology within a pedagogical model that places critical thinking at the center.

The objectives are to examine the impact of AI-enhanced instruction on students' critical thinking development, to identify instructional strategies that effectively promote analysis, evaluation, and reflection, and to compare outcomes between students exposed to AI-enhanced instruction and those receiving traditional instruction. Accordingly, the study addresses the following research questions:

**RQ1**. How does the integration of AI-generated content into foreign language instruction affect the development of students' critical thinking skills?

**RQ2**. What instructional strategies using AI-generated content are most effective in promoting analysis, evaluation, and reflection?

**RQ3**. Are there observable differences in critical thinking outcomes between students exposed to AI-enhanced instruction and those receiving traditional instruction?

## Literature Review

Critical thinking has long been regarded as a cornerstone of education. It supports academic success, strengthens professional competence, and fosters civic engagement. Despite the existence of various definitions, scholars agree that it involves purposeful judgment, reflective inquiry, and higher-order reasoning. Facione (1990) identified analysis and evaluation as core skills. Halpern (2002) highlighted the importance of metacognitive awareness, while Paul and Elder (2006) emphasized the need to combine intellectual standards with personal dispositions. Taken together, these perspectives demonstrate that critical thinking is both a set of cognitive skills and a cultivated character trait.

Foreign language education serves as a powerful context for strengthening these abilities. Many studies confirm this potential. Liu (2020) emphasized the importance of embedding critical thinking into language education. Yan (2021) showed that teachers' own critical thinking directly shapes student engagement. Sholeh (2020) and Nguyen (2025) demonstrated that task-based and project-based learning

can foster analytical and collaborative skills. Ukrainian scholars, such as Pometun (2020), Tiaglo (2024), and Terno (2007), argued that critical thinking is not innate but must be intentionally cultivated through structured inquiry. Lytvynko et al. (2025) noted that authentic texts are essential for encouraging critical engagement in English classrooms.

The growing presence of AI has added new dimensions to this discussion. The analyzed studies show that AI tools can stimulate higher-order thinking when used thoughtfully. Chen (2025) and Yin (2024) examined AI-powered feedback in writing. Favero et al. (2024) and Tafazoli (2024) explored Socratic chatbots and AI-mediated dialogue. Silor and Silor (2025) reported improvements in reading comprehension, while Avsheniuk et al. (2024) and Alshammari (2024) highlighted AI's potential to support learners' autonomy and critical engagement. A common theme across these studies is that AI is most effective when learners actively question and evaluate its outputs rather than accept them passively.

Recent empirical studies further reinforce the pedagogical value of integrating AI into foreign language instruction. Qi et al. (2025) found that flipped classroom pedagogy strengthens critical thinking in argumentative writing. Poulikova and Gadusova (2025) validated tools for assessing adolescents' critical thinking. EL-Asri and El Karfa (2024) demonstrated that classroom-based action research fosters inquiry-driven tasks. Together, these studies confirm that critical thinking does not emerge automatically from language learning or the use of technology. It must be deliberately cultivated through structured pedagogy, reflective practice, and learner-centered approaches. Within this context, AI can serve as a powerful stimulus for analysis, evaluation, and creative reasoning when embedded in purposeful instructional design.

## Methods

### *Research Approach*

This study used a mixed-methods design (quantitative and qualitative approaches) to examine the effectiveness of the proposed innovative pedagogical model aimed at developing critical thinking within foreign language instruction supported by digital tools. A quasi-experimental design was employed, with participants selected from intact classes rather than randomly assigned groups. This setup enabled a comparison between the Experimental Group (EG), which implemented the technology-integrated model, and the Control Group (CG) that received traditional instruction, while preserving the authenticity of the classroom setting.

A comprehensive review of the relevant literature provided the basis for constructing the study's conceptual framework. The quantitative component involved pre- and post-testing to assess changes in students' critical thinking skills over the course of the intervention. The qualitative component comprised structured classroom observations, focused student surveys, and reflective teaching accounts. These qualitative data extended beyond descriptive reporting and an active role in shaping both the design and interpretation of the study. Classroom observations contributed to refining instructional strategies during the intervention. Surveys elicited students' perspectives on autonomy and self-regulation. Teacher reflections provided valuable insights into student engagement with digitally supported tasks. Together, the qualitative findings provided explanatory depth to the quantitative results, ensuring that the evaluation of the pedagogical model was both methodologically sound and pedagogically meaningful.

### *Participants*

The study involved 64 undergraduate students (aged 17–19) from the Faculty of Geography and the Faculty of Arts at Ternopil Volodymyr Hnatiuk National Pedagogical University (Ukraine). All participants had an A2–B1 English proficiency level (CEFR) according to the Common European Framework and no prior formal instruction in critical thinking. Participants were drawn from intact classes in two faculties. Random assignment was not possible; instead, one class was designated as the EG and another as the CG: 1) EG (n = 32): received instruction that integrated AI-generated content (tasks) based on a pedagogical model to develop critical thinking skills; 2) CG (n = 32): received traditional instruction without AI or a critical thinking focus.

The same instructors taught both groups to minimize teaching-related variability. Potential differences between faculties were statistically controlled by comparing baseline measures of language proficiency and critical thinking disposition, ensuring that outcome differences could be attributed to the intervention rather than faculty background. Participation was voluntary, with informed consent obtained from all students.

### AI-Enhanced Pedagogical Model for Critical Thinking

Based on a literature review and preliminary research, we developed a pedagogical model with critical thinking as its core instructional objective. As shown in *Figure 1*, this model integrates six core instructional elements (Instructional Strategies, Learning Materials, Student Activities, Teacher Roles, Learning Environment, and Assessment), each reinforced through Digital Integration (practical application of AI tools) and a Critical Thinking Focus (overall instructional objectives). This dual reinforcement ensures that the use of technology remains purposeful and analytical.

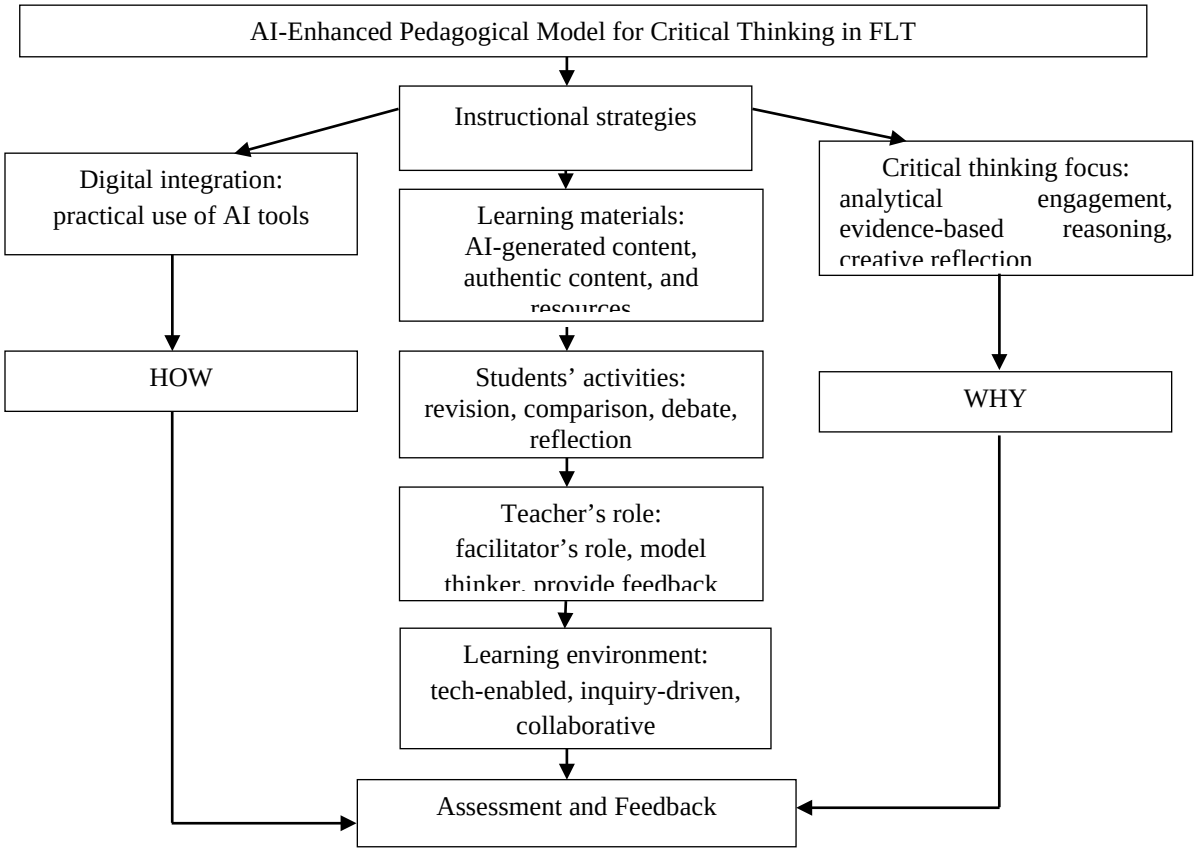



*Figure 1*. AI-Enhanced Pedagogical Model for Critical Thinking in FLT (created by authors)

The proposed model is unique because it positions AI-produced texts not as learning tools but as materials for critical examination and reflection. By using AI-generated content, students learnt to challenge reliability, uncover bias, and reflect on cultural implications, building a foundation for independent thought. Whereas previous research has primarily emphasized academic efficiency or language proficiency, this framework places critical thinking at the heart of technology-supported instruction. Its innovative contribution lies in presenting a structured

approach that connects technological integration with higher-order skills, supporting student autonomy, strengthening digital literacy, and providing practical guidance for curriculum design in multilingual and technology-rich educational contexts.

Implementation of the Pedagogical Model

The pedagogical model was **implemented** through carefully designed lesson plans that integrated AI tools with critical thinking tasks. Throughout this period, students were engaged with a range of thematic units, including Arts, Holidays, and Technology and Society. Table 1 (Appendix A) illustrates a representative lesson on "Holiday Traditions", showing how classroom activities are aligned with pedagogical phases.

***Research Design***

During the study, the following materials were used: AI-generated content (texts, prompts, and feedback) from ChatGPT, Google Translate, and DeepL; authentic learning content in English (workplace communication, promotional texts, machine-translated dialogues); course materials: "Complete Preliminary B1 and B2" by Heyderman and May (2021) (Student's Book, Workbook, audio-visual materials).

Both the EG and CG followed the same curriculum and used identical core materials. However, students from the EG engaged with AI tools during instruction and completed tasks specifically designed to stimulate critical thinking, such as analyzing, revising, and evaluating AI-generated content. In contrast, CG students received traditional instruction focused on grammar, vocabulary, and comprehension without AI integration or explicit cognitive training. Table 2 below summarizes the overall experimental design, highlighting the key differences between the EG and the CG.

Table 2. *Overview of experimental design*

| Component | Experimental Group (EG) | Control Group (CG) |
|---|---|---|
| Instructional Approach | AI-enhanced foreign language instruction with explicit critical thinking tasks. | Traditional foreign language instruction without AI or critical thinking focus. |
| Learning Materials | AI-powered language learning platforms (e.g., Duolingo, ChatGPT, Grammarly); AI-generated texts (translations, reviews, prompts); Course materials: "Complete Preliminary" by Heyderman and May (2021). | Teacher-generated tasks, course materials: "Complete Preliminary" by Heyderman and May (2021); Standard writing and speaking exercises. |
| Student Activities | Analysis and revision of AI texts; Identifying errors and biases; Justifying corrections. | Reading and comprehending texts; Completing standard grammar and vocabulary exercises |
| Focus of Instruction | Development of critical thinking through language tasks. | Language acquisition without explicit cognitive training. |
| Assessment Criteria | Pre- and post-tests based on the adapted version of CCTST; a targeted survey; classroom observations; quantitative analysis was conducted using SPSS, while qualitative data were examined thematically using NVivo, based on standard language performance (accuracy, fluency, comprehension). | |
| Duration | 4 months (February – May 2024) | |

This study was conducted in three phases, as detailed in Table 3.

Table 3. *Stages of the experiment*

| Stage | Objective | Description |
|---|---|---|
| Stage 1: Preparation & Pre-Assessment (February 2024) | Establish baseline data and prepare participants | - developing assessment criteria;<br>- administration of the Critical Thinking Skills Test (CCTST) to both groups;<br>- preparation of AI-generated texts and tasks;<br>- administration of a Language Proficiency Test (LPT) |
| Stage 2: Intervention (February–May 2024) | Implement differentiated instruction | - implementation of instructional strategies (questioning techniques, problem-based tasks, discussions and debates, role-play, reflective writing, etc.) over 3 months;<br>- designing weekly tasks to stimulate students' critical thinking (e.g., debates, problem-solving, AI-assisted writing) in the EG;<br>- keeping reflective journals by instructors to track students' thinking processes. |
| Stage 3: Post-Assessment & Analysis (End of May 2024) | Evaluate outcomes and analyze data | - post-testing (CCTST and LPT);<br>- collecting student reflections, survey responses, and observational data;<br>- quantitative (SPSS) and qualitative analysis (NVivo);<br>- interpretation of survey results. |

***Data Collection and Analysis***

To evaluate the impact of AI-enhanced instruction on students' critical thinking, the study used a mixed-methods approach, combining both quantitative and qualitative data.

*Quantitative data* were collected through pre- and post-tests using an adapted California Critical Thinking Skills Test (CCTST), analysed with SPSS using descriptive statistics (such as means and standard deviations), a paired-sample t-test to measure changes within each group, and ANCOVA to compare post-test scores between the EG and CG while controlling for pre-test scores, language proficiency, and faculty affiliation.

*Qualitative data* were gathered from three primary sources: a post-intervention survey administered only to the EG (Table 4), student reflection journals, and structured classroom observations. The survey featured five open-ended questions designed to explore students' perceptions of AI-assisted learning, its influence on their critical thinking development.

Table 4. *Post-intervention survey questions for the experimental group*

| № | Question | Focus Area |
|---|---|---|
| 1 | How did interacting with AI-generated texts change your approach to reading new information? | Metacognitive Awareness |
| 2 | Describe a time when you questioned the accuracy or bias of an AI response. What made you sceptical? | Critical Evaluation |
| 3 | To what extent did AI-based tasks help you improve your ability to justify opinions with evidence? | Evidence-Based Reasoning |
| 4 | How did comparing your ideas with AI outputs influence your thinking process? | Comparative Analysis |
| 5 | What challenges did you face when thinking critically about AI's output? | Learning Challenges |

To evaluate students' critical thinking performance during instructional tasks, the authors developed criteria based on established cognitive indicators and adapted to the context of foreign language instruction. The criteria include: clarity of argument, use of evidence, depth of analysis, consideration of alternatives, and language use. Each criterion is evaluated using a four-point scale

(Excellent, Good, Average, Poor), which allows for consistent evaluation of both written and oral output. This framework was applied during pre- and post-intervention stages to analyse students' responses to AI-generated texts, classroom discussions, and reflective writing (Table 5).

Table 5. *Criteria for assessing critical thinking skills in writing and discussion*

| Criteria | Excellent | Good | Fair | Poor |
|---|---|---|---|---|
| Clarity of argument | Clear, focused thesis with strong logical flow | Mostly clear with minor lapses | Some clarity, but lacks cohesion | Unclear or incoherent |
| Use of evidence | Strong, relevant examples and support | Adequate support with some relevance | Limited or weak evidence | No evidence or irrelevant support |
| Depth of analysis | Insightful, nuanced reasoning | Reasonable analysis with some depth | Basic reasoning, lacks depth | Superficial or absent analysis |
| Consideration of alternatives | Thoughtfully addresses counterarguments | Mentions alternatives with limited critique | Brief or vague mention | No consideration of other views |
| Language Use | Sophisticated, accurate use of target language | Mostly accurate with varied vocabulary | Some errors, limited vocabulary | Frequent errors, basic vocabulary |

## Results

This section presents the research findings evaluating the effectiveness of an AI-enhanced teaching model in cultivating critical thinking skills. The results are divided into three parts:

1) Quantitative analysis of pre- and post-test Critical Thinking Skills Test (CCTST) scores, including descriptive and inferential statistics, was conducted to compare the EG and CG;

2) Qualitative analysis identified themes emerging from post-intervention surveys, student reflections, and classroom observations:

*Theme 1*: Autonomy and self-regulation – students in the EG reported greater confidence in questioning AI outputs and revising them independently, directly addressing RQ 1;

*Theme 2*: Evaluative engagement with AI – reflections showed that learners moved beyond passive use of AI tools, critically assessing bias and inaccuracies, which links to RQ2;

*Theme 3*: Classroom interaction and collaboration – observations revealed that peer discussions around AI-generated texts stimulated metacognitive awareness, supporting RQ 3.

3). Synthesis of the data from both groups provided a comprehensive answer to the research questions. Quantitative gains in CCTST scores for the EG were explained by qualitative evidence of increased autonomy, evaluative engagement, and collaborative reflection.

### *Quantitative Analysis of Critical Thinking Skills*

To assess the extent of improvement in students' critical thinking, an adapted version of the CCTST was administered to both the EG and CG before and after the four-month intervention.

The descriptive statistics (Table 6) revealed that both groups began with nearly similar scores (EG: M = 18.75, SD = 3.12; CG: M = 18.53, SD = 3.07). After the intervention, the EG demonstrated a substantial mean increase of 5.53 points (Post-test: M = 24.28, SD = 2.95), whereas the CG showed only a minor gain of 0.88 points (Post-test: M = 19.41, SD = 3.22).

Table 6. *Descriptive statistics of CCTST scores*

| Group | Test | Mean (M) | Standard Deviation (SD) | Min | Max |
|---|---|---|---|---|---|
| EG | Pre-test | 18.75 | 3.12 | 12 | 24 |
| EG | Post-test | 24.28 | 2.95 | 18 | 31 |

| | | | | | |
|---|---|---|---|---|---|
| CG | Pre-test | 18.53 | 3.07 | 13 | 23 |
| **CG** | Post-test | 19.41 | 3.22 | 14 | 26 |

As illustrated in Figure 2, the EG showed a substantial mean increase of 5.53 points, while the CG improved by only 0.88 points.

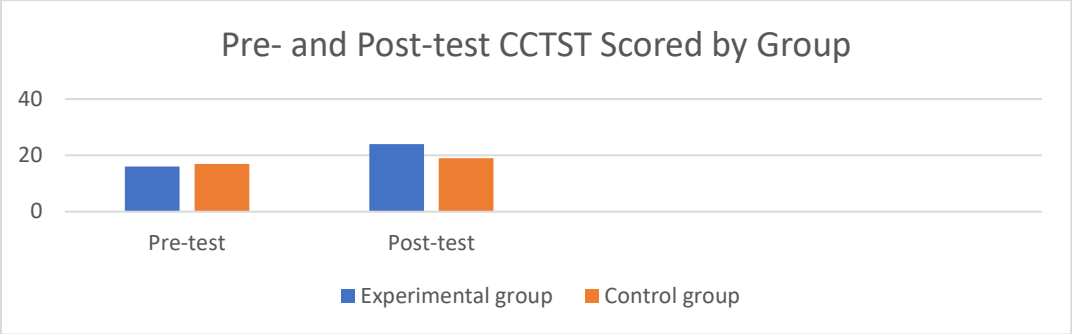



*Figure 2.* Comparison of **pre- and post-test CCTST scores** for the EG and CG

Inferential statistics confirmed the significance of these differences. These results demonstrate that AI-enhanced instruction had a measurable and substantial impact on students' critical thinking development.

A paired-samples t-test was used to assess changes within each group. The test statistic was calculated as:

$$t = \frac{X_{post} + X_{pre}}{SE}, \text{ where } SE = \frac{SD_d}{\sqrt{n}}$$

Results revealed a statistically significant improvement in the EG, t (31) = 10.12, $p < 0.001$, with a large effect size (Cohen's d = 1.79), indicating substantial gains in critical thinking skills following AI-enhanced instruction. In contrast, the CG showed only slight improvement, t (31) = 2.11, p = 0.042, with a small effect size (Cohen's d = 0.37), indicating limited cognitive growth under traditional instruction.

To further examine differences between groups, an Analysis of Covariance (ANCOVA) was employed. This allowed for comparison of post-test scores while statistically controlling for pre-test performance, language proficiency, and faculty affiliation. The model is represented as:

$$Y_{ij} = \mu + \tau_i + \beta(X_{ij} - X) + \epsilon_{ij}$$

Where: Yij = post-test score

Xij = pre-test score (covariate)

τi = group effect (EG vs CG)

The ANCOVA demonstrated a substantial effect on students' critical thinking development, with $F(1, 61) = 35.47$, $p < 0.001$, and a partial $\eta^2$ of 0.368. This indicates that approximately 37% of the variance in post-test scores can be attributed to the AI-enhanced pedagogical model. These statistical results are summarized in Figure 3, which presents the comparative outcomes of both the within-group and between-group analyses.

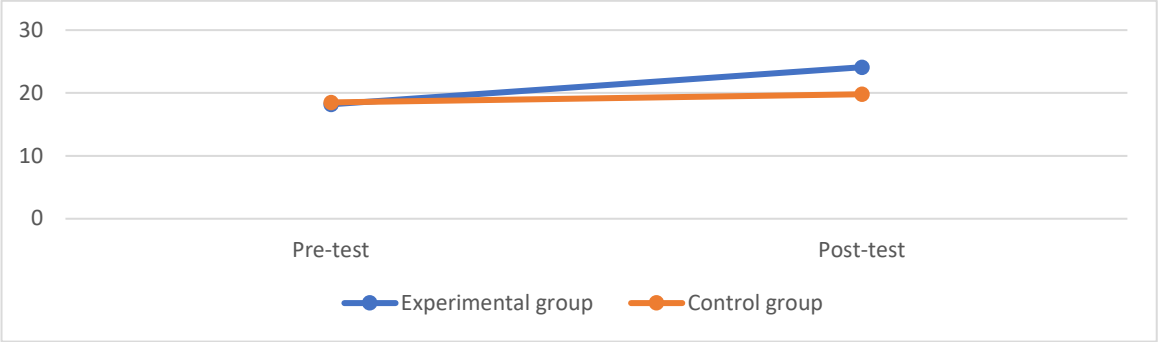



*Figure 3.* Statistical results summarizing the paired-samples *t*-tests (within groups) and ANCOVA (between groups)

***Qualitative Analysis of Critical Engagement***

Qualitative data were collected from post-intervention surveys (for students from EG only), reflection journals, and classroom observations. Thematic analysis identified five key areas of cognitive growth described in Table 7.

Table 7. *Thematic analysis of student reflections and survey responses*

| Theme | Frequency (%) | Example Student Quote |
|---|---|---|
| Questioning AI Outputs | 78% | "I started asking *why* the AI phrased things this way, not just accepting it". |
| Evidence-Based Reasoning | 65% | "I checked multiple sources before trusting AI's answer about holiday traditions". |
| Engagement in Debates | 72% | "It was easier to discuss ideas when AI gave us something controversial to start with". |
| Awareness of Bias | 48% | 'I noticed AI sometimes gave stereotypical examples of cultures". |
| Revising Thinking | 54% | "After peer feedback, I realized I had misunderstood the argument and revised my view". |

Students frequently experienced moments of doubt, revision, and discovery when engaging with AI-generated texts. One student reflected, "I realized that AI can be wrong. I had to check facts and think more deeply than usual". Another noted, "It gave me the wrong date. Now I always double-check its facts". A third added, "I saw it made a weak argument. I had to build a stronger one". These reflections illustrate a growing metacognitive awareness and a shift toward more critical engagement with digital content.

Classroom observations reinforced these findings: students in the EG consistently posed deeper questions, challenged assumptions, and revised their work based on reflective inquiry. Instructors reported that EG students initiated 41% more critical questions during discussions compared to the control group. The frequency analysis of critical thinking behaviors (Table 8) demonstrated a clear and consistent advantage for the experimental group across all indicators, underscoring their heightened activity and more advanced cognitive engagement.

Table 8. *Frequency of critical thinking indicators*

| Indicators | EG (students) | CG (students) |
|---|---|---|
| Thoughtful questioning | 28 | 11 |
| Evidence-based reasoning | 26 | 13 |
| Revision of ideas | 30 | 9 |
| Consideration of alternatives | 25 | 7 |

***Synthesis of Quantitative and Qualitative Findings***

The integration of test scores, student reflections, and classroom observations provides a comprehensive and compelling picture of the intervention's impact. The significant quantitative gains on the CCTST are directly reflected in the qualitative evidence of students' behavioural and cognitive shifts.

The quantitative data confirm a significant improvement in critical thinking, while the qualitative data reveal the process by which this improvement occurred. For example, the "Evidence-Based Reasoning" indicator (65%) corresponds with its high observed frequency (26 instances) and reflects the "Analysis" and "Evaluation" dimensions assessed by the CCTST. Similarly, the frequent occurrence of "Revising Thinking" (54% thematically, 30 instances) illustrates the "Self-regulation" aspect of critical thinking.

Classroom observations confirmed that the pedagogical model's focus on analytical engagement, evidence-based reasoning, and dialogic thinking effectively fostered the learning environment where critical examination of AI-generated content became a routine practice. Students demonstrated active engagement with technology by questioning, evaluating, and revising AI outputs, a process that advanced both their linguistic competence and cognitive autonomy. Both the substantial rise in critical thinking scores and the observed behavioural changes confirm that the AI-enhanced model cultivated a sustainable and transferable capacity for critical thinking in the EG.

**Discussion**

The study's findings, supported by both quantitative results and qualitative observations, confirm that well-designed teaching strategies can enhance students' cognitive development and serve as a powerful catalyst for cultivating critical thinking in the FLT process.

Regarding RQ1, the quantitative data demonstrate that integrating digitally supported learning tasks into the FLT contributed positively to the development of undergraduate students' critical thinking skills. The EGs' higher CCTST scores indicate their improved abilities in analysis, evaluation, and inference. These outcomes are consistent with Facione (1990) and correspond to the kind of rational decision-making defined by Ennis (2016). It also aligns with Qi et al. (2025) findings, which suggest that structured pedagogical models, such as flipped classrooms, can promote critical thinking in argumentative writing. Students consistently demonstrated elements of "purposeful, self-regulatory judgment," transforming their interactions with technology-mediated materials into opportunities for analytical reflection and intellectual responsibility.

Regarding RQ2, thematic analysis and classroom observations revealed active learner engagement in critical questioning, reasoning, and evaluation of instructional content. The frequent use of inquiry-based discussions and evidence-guided argumentation highlighted the effectiveness of teaching strategies. They encouraged students to become active critical participants instead of being passive recipients of information. These learning behaviors are consistent with the intellectual standards of clarity, accuracy, and relevance proposed by Paul and

Elder (2006). Instead of accepting information uncritically, students were prompted to apply these standards during classroom activities, fostering sustained habits of reflective judgment and disciplined inquiry. Dialogic tasks, including debates and reflective journaling, further supported the development of higher-order thinking, echoing the pedagogical perspectives of Lipman (2003) and Brookfield (2013). Comparable results were reported by Avsheniuk et al. (2024) and Jai Lamimi et al. (2025), who similarly observed that learners' cognitive growth is strengthened when students actively interrogate and evaluate information.

Addressing RQ3, ANCOVA results indicated that the applied pedagogical model contributed 37% of the variance in post-test scores, underscoring its effectiveness. Classroom observations reinforced these results. In the EG, students exhibited more frequent critical thinking behaviors, such as purposeful questioning and deeper analytical engagement, during learning tasks. These outcomes are consistent with recent studies (Alshammari, 2024; Zakaria et al., 2025; Darwin et al., 2024; Liu et al., 2025), which emphasize that the educational value of digital technologies lies not in the provision of ready-made answers but in their capacity to stimulate deeper cognitive engagement when learners are guided to interact with them critically. In the same spirit, El-Asri and El Karfa (2024) showed that inquiry-based classroom practices nurture collaborative critical thinking. Their work highlights the vital role that structured, dialogue-driven activities play in technology-supported learning environments.

In conclusion, this study shows that critical thinking does not develop automatically. It requires purposeful pedagogical design based on reflection, dialogue, and analytical engagement. Drawing on Ukrainian traditions of critical thinking pedagogy (Pometun, 2020; Avsheniuk et al., 2024), the findings reveal that students benefit most when learning tasks consistently involve evaluation, reasoning, and independent judgment. Building on Terno's (2007) principles in history education, the research demonstrates how these approaches can be effectively adapted to digitally enriched language learning contexts. By teaching students to question and evaluate information rather than accept it uncritically, educators can better prepare them for independent thinking and successful participation in an increasingly complex global environment.

## Conclusion

The findings of this study demonstrate that integrating AI-generated content into foreign language instruction significantly enhances students' critical thinking skills. Quantitative results revealed substantial gains in the EG's CCTST scores, while qualitative evidence highlighted increased autonomy, evaluative engagement, and collaborative reflection. Together, these outcomes confirm that the AI-enhanced pedagogical model not only improved students' ability to question, analyze, and revise digital texts but also fostered metacognitive awareness and evidence-based reasoning.

Importantly, the model proved effective in positioning AI outputs as material for critique rather than passive consumption, thereby cultivating linguistic competence alongside cognitive autonomy. These results suggest that AI-supported instruction can serve as a transferable and enduring framework for developing higher-order thinking skills in foreign language education. Future research should extend this approach across disciplines and proficiency levels to validate its broader applicability and to refine strategies that balance technological integration with critical inquiry.

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## References

Alshammari, J. (2024). Revolutionizing EFL learning through ChatGPT: A qualitative study. *World Journal of English Language, 12*(7), 1–15. https://doi.org/10.5430/wjel.v12n7p1

Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives.* New York: Longman.

Avsheniuk, N., Lutsenko, O., Svyrydiuk, T., & Seminikhyna, N. (2024). Empowering language learners' critical thinking: Evaluating ChatGPT's role in English course implementation. *Arab World English Journal (AWEJ) Special Issue on ChatGPT,* 210–224. https://dx.doi.org/10.24093/awej/ChatGPT.14

Chen, Q. (2025). Students' perceptions of AI-powered feedback in English writing: Benefits and challenges in higher education. *International Journal of Changes in Education, 3*(2), 1–11. https://doi.org/10.47852/bonviewIJCE52025580

Darwin, D. et al. (2024). Critical thinking in the AI era: An exploration of EFL students' perceptions, benefits, and limitations. *Cogent Education, 11*(1), 2290342. https://doi.org/10.1080/2331186X.2023.2290342

Deming, D. J. (2021). *The growing importance of decision-making on the job* (NBER Working Paper No. 28733). National Bureau of Economic Research. http://www.nber.org/papers/w28733

EL-Asri, S., & El Karfa, A. (2024). A mixed-method action research on promoting critical thinking in the classroom: Implications for EFL teachers. *Arab World English Journal, 15*(2), 288–304. https://dx.doi.org/10.24093/awej/vol15no2.18

Facione, P. A. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction (The Delphi Report).* California Academic Press.

Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2024). Enhancing critical thinking in education by means of a Socratic chatbot. *arXiv Preprint.* https://doi.org/10.48550/arXiv.2409.05511

Foster, N., & Piacentini, M. (Eds.). (2023). *Innovating assessments to measure and support complex skills.* OECD Publishing. https://doi.org/10.1787/e5f3e341-en

Glaser, E. M. (1941). *An experiment in the development of critical thinking.* Teachers College, Columbia University.

Halpern, D. F. (2002). *Thought and knowledge: An introduction to critical thinking* (4th ed.). Psychology Press. https://doi.org/10.4324/9781410606433

Jai Lamimi, I., El Jemli, S., & Zeryouh, I. (2025). Enhancing critical thinking: Exploring human-AI synergy in student cognitive development. *Arab World English Journal (AWEJ) Special Issue on Artificial Intelligence,* 251–269. https://dx.doi.org/10.24093/awej/AI.14

Lipman, M. (2003). *Thinking in education* (2nd ed.). Cambridge University Press.

Liu, J., Sihes, A. J. B., & Lu, Y. (2025). How do generative artificial intelligence (AI) tools and large language models (LLMs) influence language learners' critical thinking in EFL education? A systematic review. *Smart Learning Environments, 12*(1), 48. https://doi.org/10.1186/s40561-025-00406-0

Liu, Q. (2020). Critical thinking and foreign language teaching. *Educational Research and Reviews, 2*(3), 35–39. http://front-sci.com/journal/rer

Lytvynko, O., Hlukhovska, M., Absaliamova, Y., Bessarab, A., &Chobaniuk, M. (2025). The Role of Authentic Texts in the Development of Critical Thinking in English Teaching.

*Arab World English Journal*, *16*(2), 459-472 DOI: https://dx.doi.org/10.24093/awej/vol16no2.26

Mehta, S. R., & Al-Mahrooqi, R. (2024). Ensuring inclusivity through critical thinking in EFL contexts. *The Journal of Teaching English for Specific and Academic Purposes, 12*(1), 25–38. https://doi.org/10.22190/JTESAP231220003

Nguyen, T. T. (2025). Evaluation of a project-based learning model in EFL learning at tertiary level: Undergraduates' voices. *VNU Journal of Foreign Studies, 41*(3), 157–169. https://doi.org/10.63023/2525-2445/jfs.ulis.5518

Paul, R., & Elder, L. (2006). *Critical thinking: Tools for taking charge of your learning and your life* (2nd ed.). Pearson Education.

Pometun, O. (2020). *New Ukrainian school: Development of critical thinking in pupils of primary school* [In Ukrainian]. Osvita.

Poulikova, I., & Gadusova, Z. (2025). Validating a critical thinking questionnaire for young adolescents: A preparatory study for a longitudinal research. *Arab World English Journal, 16*(2), 414–429. https://dx.doi.org/10.24093/awej/vol16no2.23

Poštić, S., Kriaučiūnė, R., & Ivancu, O. (2023). Viewpoints on the development of critical thinking skills in the process of foreign language teaching in higher education and the labour market. *Education Sciences, 13*(2), 1–14. https://doi.org/10.3390/educsci13020152

Qi, H., Kamal, S. S. L. A., & Lahlou, H. (2025). Impact of flipped classroom on developing critical thinking skills in Chinese EFL undergraduates' argumentative essays: A pilot study. *Arab World English Journal, 16*(2), 153–167. https://dx.doi.org/10.24093/awej/vol16no2.9

Sholeh, M. B. (2020). Task-based learning in the classroom for EFL learners: A review. *LINGUA: Jurnal Bahasa, Sastra, Dan Pengajarannya, 17*(2), 123–134. https://doi.org/10.30957/lingua.v17i2.641

Silor, A. C., & Silor, F. S. C. (2025). Boosting reading comprehension through AI-based learning tools. *International Journal of Learning, Teaching and Educational Research, 24*(9), 61–79. https://doi.org/10.26803/ijlter.24.9.4

Tafazoli, D. (2024). Critical appraisal of artificial intelligence-mediated communication. In H.P. Bui, R. Kumar & N. K. Kamila (Eds.), *Innovations and applications of technology in language education* (Chapter 4). Taylor & Francis https://doi.org/10.48550/arXiv.2305.11897

Terno, S. O. (2007). Rozvytok krytychnoho myslennia uchniv starshoi shkoly na urokakh istorii. [Development of critical thinking among high school students in history lessons]. *Scientific Papers of the History Faculty of Zaporizhzhia State University*, 21, 483–487. [In Ukrainian].

Tiaglo, O. (2024). To comprehension of the critical thinking nature: Philosophy of heart. *The Journal of V. N. Karazin Kharkiv National University*, Series Philosophy. *Philosophical Peripeteias, 71*, 6–16. https://doi.org/10.26565/2226-0994-2024-71-1

Yan, Z. (2021). EFL teachers' critical thinking ability and its impact on students' learning engagement. *Journal of Language Teaching and Research, 12*(3), 456–464. https://doi.org/10.3389/fpsyg.2021.773138

Yin, X. (2024). A critical thinking-oriented approach in English as a foreign language (EFL) writing: Using ChatGPT as an ideal peer. In Proceedings of the XXI International CALL

Research Conference (pp. 327–332). Castledown. https://doi.org/10.29140/9780648184485-49

Zakaria, N. Y. K., Hashim, H., & Zakaria, K. (2023). Exploring the impact of AI on critical thinking development in ESL: A systematic literature review. *Arab World English Journal*, *15*(4), 112–128. https://dx.doi.org/10.24093/awej/AI.19

## Appendix A: Example of a lesson plan

Table 1. *Example of a lesson plan: "holiday traditions"*

| Lesson Component | Description | Pedagogical Model Phase |
|---|---|---|
| Topic | Holiday Traditions | |
| Objectives | Develop critical thinking through AI interaction. Practicing reading, speaking, and writing. Exploring cultural perspectives. | |
| Tools Used | AI chatbots (e.g., ChatGPT, Copilot), internet-connected devices, and fact-checking websites. | |
| Warm-Up (10min) | Brainstorming on holidays celebrated in the country, sharing knowledge on customs and traditions. Pair-work and group activities. | |
| AI Exploration (15 min) | Students set an AI prompt: "Describe how the New Year is celebrated in Japan and Brazil." Highlighting surprising facts, stereotypes. | Analytical engagement |
| Fact-Checking (10 min) | Researching real traditions and comparing them with AI output. Creating a "Fact vs Fiction" chart. | Evidence-Based Reasoning |
| Creative Task (10 min) | Students invent a new holiday and ask AI to describe it. Then they revise the response to improve cultural relevance or creativity. | Creative Reframing |
| Debates (10 min) | Students write a journal entry: *"What did I learn about AI today? How can I think critically when using it?", or debate on "AI is a reliable tool for learning about other cultures"*. | **Dialogic Thinking** |
| Reflection (5 min) | Answering questions: "What did I learn about using AI today? How did my thinking change?" | **Reflective Inquiry** |
| **Homework** | Writing: Compare two holiday traditions using AI and personal experience. Designing a poster. | |