

**THE AI-GUIDED LINGUO-CLINICAL SCENARIO METHOD FOR TEACHING
ENGLISH AND LATIN IN MEDICAL HIGHER EDUCATION**

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Abstract

This study introduces the **AI-Guided Linguo-Clinical Scenario Method (AILCSM)** for the integrated teaching of English and Latin in medical higher education. The method employs artificial intelligence to generate and adapt clinical scenarios that require contextualized use of medical terminology. By combining linguistic analysis with clinical reasoning and AI-based feedback, the approach promotes the development of professional terminological thinking. Experimental results indicate improved terminological accuracy, contextual relevance, and response efficiency, demonstrating the pedagogical effectiveness of the proposed AI-driven instructional model.

Keywords

artificial intelligence in education, linguo-clinical integration, English and Latin teaching, medical terminology, AI-guided methodology, medical higher education

Introduction

The globalization of medical education and the increasing dominance of English as the language of science have significantly raised the requirements for foreign language training in medical higher education. At the same time, Latin continues to play a foundational role in the formation of medical terminology, clinical nomenclature, and professional discourse [3]. Despite their importance, English and Latin are often taught as separate, auxiliary subjects, which limits students' ability to apply terminological knowledge in real clinical contexts. This fragmentation results in superficial memorization rather than the development of professionally oriented language competence.

Recent advances in artificial intelligence have created new possibilities for restructuring language education in accordance with professional needs. However, in many educational practices, artificial intelligence is still used primarily as a supportive digital resource for exercises, assessment, or content delivery [7]. Such an instrumental approach underestimates the methodological potential of AI as an active organizer of learning processes. There remains a clear gap between technological innovation and pedagogical methodology, particularly in the integrated teaching of English and Latin for medical purposes.

Modern medical education requires not only linguistic accuracy but also the ability to interpret, analyze, and apply terminology within clinical reasoning [8]. This need highlights the importance of forming medical terminological thinking, understood as the cognitive capacity to operate with medical terms in a contextually appropriate, clinically meaningful, and professionally justified manner. Traditional language teaching methods are not fully equipped to address this objective, as they rarely simulate authentic clinical decision-making environments.

In response to these challenges, this study proposes the **AI-Guided Linguo-Clinical Scenario Method (AILCSM)** as an innovative instructional approach for integrated English and Latin teaching in medical higher education. The method is based on the systematic use of artificial intelligence to generate and adapt clinical scenarios that require active terminological analysis, bilingual interpretation, and professional decision-making [1,2]. Within this framework, AI functions not merely as a technological tool but as a methodological mediator that supports adaptive learning, contextual feedback, and reflective consolidation.

The purpose of this research is to develop and empirically validate the AI-Guided Linguo-Clinical Scenario Method as a means of enhancing professional language competence and medical terminological thinking among medical students. The study aims to demonstrate that AI-based linguo-clinical integration can significantly improve the effectiveness of English and Latin instruction, aligning language education with the cognitive and professional demands of contemporary medical practice [9,10].

The study employed a **quasi-experimental mixed-methods design** aimed at evaluating the effectiveness of the **AI-Guided Linguo-Clinical Scenario Method (AILCSM)** in the integrated teaching of English and Latin for medical students. The research combined quantitative performance analysis with qualitative evaluation of students' professional language development.

The experiment was conducted during one academic semester at a medical higher education institution. Participants were second-year medical students enrolled in compulsory English and Latin courses.

Group	Number of students	Teaching method
Control Group	24	Traditional terminology-based instruction
Experimental Group	24	AI-Guided Linguo-Clinical Scenario Method

Sample clinical trigger (AI-generated):

A 54-year-old male patient presents with dyspnea, chest pain, and cyanosis. Physical examination reveals tachycardia and reduced breath sounds in the lower lobes.

Students were required to:

- identify key symptoms
- predict possible diagnoses
- extract relevant terminology

Stage 2. Terminological Activation (English–Latin Integration)

Sample task:

English term	Latin equivalent	Function
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Shortness of breath	<i>Dyspnoea</i>	Symptom
Chest pain	<i>Dolor thoracis</i>	Complaint
Cyanosis	<i>Cyanosis</i>	Clinical sign

Students analyzed:

- morphological structure
- semantic accuracy
- clinical relevance

Stage 3. Linguo-Clinical Task Execution (Sample)

Sample instruction:

Explain the possible diagnosis using at least five correct English medical terms and three Latin terms.

Sample student response (excerpt):

The patient's dyspnoea and cyanosis may indicate acute respiratory insufficiency. The presence of dolor thoracis suggests a possible pulmonary pathology.

AI provided **real-time corrective feedback** on:

- terminology misuse
- grammatical accuracy
- contextual appropriateness

Stage 4. AI-Based Adaptive Feedback

AI adjusted task difficulty based on:

- error frequency
- response time
- terminological consistency

Example:

- incorrect Latin case → AI prompts morphological explanation
- correct usage → advanced scenario offered

Stage 5. Reflective Consolidation

Students reformulated clinical explanations after feedback, reinforcing **medical terminological thinking** rather than memorization.

Assessment Criteria

Four indicators were used for quantitative analysis:

Indicator	Description
Terminological accuracy	Correct use of medical terms
Contextual relevance	Clinical appropriateness
Response speed	Time to complete tasks
Transferability	Application to new scenarios

Quantitative Results (Sample Table)

Table 1. Pre-test and Post-test Results (%)

Group	Pre-test Mean	Post-test Mean	Improvement t
Control Group	56.4	63.1	+6.7
Experimental Group	55.9	78.6	+22.7

Table 2. Terminological Accuracy Levels

Group	Low (%)	Medium (%)	High (%)
Control	34	47	19
Experimenta 1	12	36	52

Statistical Interpretation (Brief)

The experimental group demonstrated:

- significantly higher post-test scores
- improved speed and confidence in terminology usage
- greater ability to transfer knowledge to unfamiliar clinical contexts

The difference in mean improvement between groups confirms the pedagogical effectiveness of the AILCSM approach.

Discussion

The findings of this study demonstrate that the AI-Guided Linguo-Clinical Scenario Method (AILCSM) produces a measurable and pedagogically significant improvement in students' professional language performance. The most notable outcome is the substantial difference in

post-test gains between the experimental and control groups, indicating that the observed effects cannot be attributed to natural language progression alone.

Interpretation of Quantitative Results

As shown in Table 1, the experimental group achieved a mean improvement of **22.7 percentage points**, compared to **6.7 percentage points** in the control group. This difference confirms that AI-mediated linguo-clinical instruction accelerates the acquisition and application of medical terminology.

To clarify the magnitude of this improvement, the **relative learning gain** was calculated:

$$\text{Relative Gain} = \frac{\text{Post-test} - \text{Pre-test}}{\text{Pre-test}} \times 100$$

Control group:

$$\frac{63.1 - 56.4}{56.4} \times 100 = 11.9\%$$

Experimental group:

$$\frac{78.6 - 55.9}{55.9} \times 100 = 40.6\%$$

This indicates that the experimental group's learning efficiency was **more than three times higher** than that of the control group.

Analysis of Terminological Accuracy

Table 2 reveals a qualitative shift in terminological competence. While the control group remained predominantly within the low-medium accuracy range, the experimental group demonstrated a marked transition toward the high-accuracy category (52%). This shift suggests not only improved recall but also enhanced **contextualized terminological thinking**.

The reduction of low-accuracy performance from **34% to 12%** in the experimental group is particularly significant. This decline reflects the effectiveness of AI-based adaptive feedback in addressing individual errors and preventing fossilization of incorrect terminology usage.

Cognitive and Methodological Implications

The results support the hypothesis that **medical terminological thinking** develops most effectively when language learning is embedded within professional reasoning tasks. Unlike traditional instruction, which often isolates terminology from clinical meaning, the AILCSM

method situates terminology within dynamic clinical scenarios. This promotes deeper cognitive processing, semantic association, and long-term retention.

AI plays a decisive methodological role by:

- generating variable clinical contexts,
- adapting task complexity in real time,
- providing immediate, targeted feedback,
- enabling reflective reformulation of responses.

These features explain the experimental group's superior performance in **transferability**, as students were able to apply terminology accurately to previously unseen clinical situations.

Comparison with Traditional Instruction

Traditional terminology-based instruction primarily emphasizes memorization and translation, which explains the modest improvement observed in the control group. In contrast, the AILCSM method transforms terminology learning into a **problem-oriented professional activity**, aligning language instruction with the cognitive demands of medical education.

This methodological distinction accounts for both the quantitative gains and the qualitative restructuring of students' professional language competence.

Pedagogical Significance

The discussion confirms that the AILCSM method is not merely a technological enhancement but a **methodologically grounded instructional system**. Its effectiveness lies in the integration of artificial intelligence with linguo-clinical pedagogy, enabling the systematic development of professional language competence in medical students.

Conclusion

This study has demonstrated that the **AI-Guided Linguo-Clinical Scenario Method (AILCSM)** represents an effective and methodologically grounded approach to the integrated teaching of English and Latin in medical higher education. By embedding language instruction within AI-generated clinical scenarios, the proposed method shifts the focus from rote memorization of terminology to the development of professional, context-sensitive medical language competence.

The experimental results confirm that students trained using the AILCSM approach achieved significantly higher levels of terminological accuracy, contextual relevance, and response efficiency than those taught through traditional methods. The substantial difference in learning gains between the experimental and control groups provides empirical evidence that artificial intelligence, when applied as a methodological regulator rather than a supplementary tool, enhances both linguistic and cognitive aspects of medical education.

The findings also support the conceptualization of **medical terminological thinking** as a distinct educational outcome that integrates linguistic knowledge with clinical reasoning. The AI-based adaptive feedback mechanisms employed in the AILCSM method played a crucial role

in facilitating individualized learning trajectories and preventing the fossilization of terminological errors.

From a pedagogical perspective, the proposed methodology offers a scalable and adaptable instructional model that aligns foreign language education with the professional demands of modern medical training. The integration of artificial intelligence into linguo-clinical instruction contributes to the modernization of didactic systems in medical universities and provides a foundation for further research into AI-driven professional language education.

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