

**AI-ASSISTED REFLECTIVE LEARNING AND COGNITIVE-CULTURAL
MAPPING IN EFL PHRASEOLOGICAL COMPETENCE DEVELOPMENT:
EVIDENCE FROM UZBEKISTANI HIGHER EDUCATION**

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Abstract. This article presents a multi-component instructional model for developing phraseological competence in EFL philology students, combining two innovations: (1) a cognitive-cultural comparative mapping framework contrasting English and Uzbek phraseological units across five conceptual domains (JOURNEY, ANIMAL, WAR, BODY, FOOD), and (2) an AI-assisted reflective learning platform (idioms-academy.uz) implementing the Self-check — Context-check — Meaning-check (SCM) metacognitive monitoring sequence. The study was conducted at Uzbekistan State World Languages University and partner institutions, involving 370 philology students in a quasi-experimental design. The AI-assisted experimental group demonstrated a statistically significant performance advantage over the control group (experimental mean: 3.80 vs. control mean: 3.39; chi-square empirical: 14.55, critical: 7.81; efficiency coefficient: 1.12). Qualitative analysis of learner reflective journals and platform usage logs revealed that the combination of cognitive-cultural mapping and AI-mediated reflective feedback fostered deeper semantic processing, enhanced cross-linguistic metalinguistic awareness, and reduced L1-induced pragmatic transfer errors. The article discusses theoretical implications for cognitive approaches to phraseological pedagogy and practical implications for technology-enhanced language instruction in Central Asian EFL contexts.

Keywords: AI-assisted language learning, reflective learning, cognitive-cultural map, phraseological competence, EFL, metacognition, cross-linguistic comparison, Uzbekistan

1. Introduction

Technology-enhanced language learning (TELL) has undergone a substantial transformation with the integration of artificial intelligence tools capable of providing individualized, adaptive, and contextualized feedback at scale (Godwin-Jones, 2022; Golonka et al., 2014). Within the domain of phraseological competence development, AI-assisted approaches hold particular promise: the complexity, cultural embeddedness, and contextual variability of phraseological units make them poorly suited to drill-and-repetition methodologies but well suited to the generative, contextualized, and reflective learning affordances offered by modern AI platforms (Hyland, 2012; Wray, 2002).

Simultaneously, cross-linguistic cognitive-cultural comparison has emerged as a theoretically motivated and pedagogically productive strategy for supporting second-language phraseological learning (Boers, 2011; Littlemore & Low, 2006). When learners are explicitly guided to compare the conceptual metaphors and cultural schemas underlying phraseological units in their L1 and L2, they develop richer, more durable semantic representations that facilitate both recognition and productive deployment of target-language phraseological units (Kövecses & Szabó, 1996).



The present article reports on a study integrating both of these approaches within a coherent pedagogical framework tested in Uzbekistani higher education. The two key components of the framework are: (1) a cognitive-cultural comparative mapping system that organizes English phraseological units within conceptual domains and provides contrastive analysis with Uzbek equivalents or conceptual parallels; and (2) an AI-assisted reflective learning platform (idioms-academy.uz) that operationalizes the Self-check — Context-check — Meaning-check (SCM) metacognitive monitoring sequence through interactive exercises, corpus-based examples, and AI-generated reflective prompts.

The theoretical contribution of this research is twofold: it advances the theoretical integration of cognitive linguistics, socio-cultural theory, and technology-enhanced learning within a unified model for phraseological pedagogy; and it provides empirical evidence from a Central Asian EFL context — a setting that has been significantly underrepresented in the international applied linguistics literature, despite hosting a rapidly expanding higher education system with strong English-language instruction mandates.

2. Theoretical Background

2.1 Cognitive-Cultural Mapping of Phraseological Units

Conceptual metaphor theory, as elaborated by Lakoff and Johnson (1980) and subsequently extended by Kövecses (2005), posits that a significant proportion of human language is organized around a relatively small inventory of experiential metaphors grounded in bodily and physical experience. Phraseological units, particularly idioms, are particularly rich repositories of such conceptual mappings: expressions like 'to be at a crossroads' (LIFE IS A JOURNEY), 'to fight tooth and nail' (ARGUMENT IS COMBAT), or 'to be the backbone of an organization' (INSTITUTIONS ARE BODIES) instantiate conceptual metaphors that are active not only in English but — with varying degrees of structural and lexical correspondence — in many of the world's languages including Uzbek.

Cognitive-cultural mapping, as developed in the present research, extends this framework by systematically comparing the lexical vehicles used to instantiate conceptual metaphors in English and Uzbek phraseological systems. The comparison operates across five conceptual domains selected for their cross-linguistic prevalence and their pedagogical tractability: JOURNEY (e.g., English 'burn one's bridges' ~ Uzbek 'ko'prikni yoqmoq'), ANIMAL (e.g., English 'as busy as a bee' ~ Uzbek 'asaldayday tirishqoq'), WAR (e.g., English 'on the front line' ~ Uzbek 'jang maydonida'), BODY (e.g., English 'cost an arm and a leg' ~ Uzbek 'jon bilan ten'), and FOOD (e.g., English 'bite off more than one can chew' ~ Uzbek 'chaynamaydigan narsani yutishga urinmoq').

This comparative approach serves multiple pedagogical purposes: it activates L1 conceptual knowledge as a scaffold for L2 phraseological acquisition; it develops cross-linguistic metalinguistic awareness; and it helps learners identify both areas of cognitive universality (where English and Uzbek share similar conceptual mappings) and areas of culture-specific divergence (where translation-equivalent phraseological units encode different metaphorical vehicles or cultural schemas), thereby reducing the risk of pragmatic transfer errors.

2.2 AI-Assisted Reflective Learning in Language Education

Reflective learning — the deliberate, structured contemplation of one's own learning processes and outcomes — has long been recognized as a powerful mechanism for deepening knowledge and developing metacognitive competence (Schön, 1987; Boud, Keogh, & Walker, 1985). In language learning contexts, reflective journaling, portfolio assessment, and learner self-evaluation have been shown to promote metalinguistic awareness and strategic competence (Nunan, 1997; Oxford, 1990).



AI integration adds three important affordances to reflective language learning. First, AI systems can provide immediate, individualized feedback on learner performance, enabling the reflective cycle to be completed within a single learning session rather than requiring delayed teacher response (Godwin-Jones, 2022). Second, AI-generated prompts can direct learner reflection toward specific aspects of phraseological use — semantic accuracy, register appropriacy, cultural connotation — that learners may not spontaneously attend to. Third, AI platforms can maintain longitudinal learner performance records, enabling both learners and instructors to track development across multiple FCDI dimensions over time.

The platform *idioms-academy.uz*, developed as an integral component of the present research, implements these affordances through a modular architecture aligned with the SCM model: a Self-check module in which learners attempt to produce or identify phraseological units before receiving system feedback; a Context-check module in which authentic corpus instances of target phraseological units are displayed for learner analysis; and a Meaning-check module in which learners compose reflective explanations of phraseological meanings that are evaluated by the AI system for semantic accuracy and pragmatic appropriateness.

3. Methodology

3.1 Research Context and Participants

The study was conducted across three Uzbekistani universities: Uzbekistan State World Languages University (UZSWLU), Mirzo Ulugbek National University of Uzbekistan (Jizzakh branch), and Gulistan State University, over the 2024–2025 academic year. Participants were 370 third-year philology students, randomly assigned to experimental ($n = 185$) and control ($n = 185$) groups. The two groups were matched for prior English proficiency (mean IELTS equivalent: B2) and demonstrated no statistically significant pre-test differences on phraseological competence measures ($p > .05$).

3.2 Instructional Protocol

The experimental group received 18 weeks of phraseological instruction organized around the cognitive-cultural mapping framework and supported by the *idioms-academy.uz* AI platform. A typical instructional sequence consisted of four phases:

Phase 1 — Cognitive-Cultural Introduction (20 minutes): The instructor presented a set of 8–10 English phraseological units organized around one of the five conceptual domains. Target units were contrasted with Uzbek phraseological equivalents or near-equivalents using the cognitive-cultural map, and the underlying conceptual metaphor was made explicit through guided discussion.

Phase 2 — Platform-Assisted Practice (25 minutes): Students worked individually on the *idioms-academy.uz* platform, completing the SCM sequence for each target phraseological unit. The Self-check module prompted recall or meaning selection; the Context-check module provided authentic usage examples from a curated corpus of academic, journalistic, and conversational texts; and the Meaning-check module prompted reflective articulation of meaning.

Phase 3 — Communicative Application (20 minutes): Students completed contextual production tasks — dialogue completion, short paragraph writing, or oral discussion — requiring the deployment of target phraseological units in appropriate communicative contexts. Peer feedback was integrated at this stage.

Phase 4 — Reflective Consolidation (15 minutes): Students wrote brief reflective entries in their digital learning journals (integrated within the platform), responding to structured prompts: 'Which phraseological unit was most challenging, and why?', 'How does this expression compare to its Uzbek equivalent?', 'In what contexts would you use this expression, and what register would be appropriate?'



The control group received conventional phraseological instruction following the existing curriculum, which primarily involved dictionary-based definition, translation into Uzbek, and context-free gap-fill exercises. Instructor contact hours were equalized across both groups (3 hours per week).

3.3 Data Collection and Analysis

Quantitative data were collected via pre-test and post-test administrations of the FCDI diagnostic battery (described in detail in Ro'ziboyev, 2026a), comprising 40 items distributed across the four FCDI dimensions. Statistical analysis employed chi-square testing (χ^2 distribution, $df = 3$, $\alpha = 0.05$) to compare experimental and control post-test score distributions, along with efficiency coefficient calculation. Additionally, platform usage logs (total sessions, Self-check accuracy rates, Meaning-check reflection quality scores) were extracted and analyzed descriptively.

Qualitative data consisted of: (a) learner reflective journal entries ($n = 370$, 18 weeks); (b) semi-structured stimulated recall interviews with a purposive sub-sample of experimental group participants ($n = 20$, 30 minutes each); and (c) AI platform Meaning-check response texts from the experimental group ($n = 185 \times 18 = 3,330$ entries). Qualitative data were analyzed using thematic analysis following Braun and Clarke (2006), with a focus on identifying patterns related to cross-linguistic metacognitive awareness, affective engagement with the SCM process, and strategic use of cognitive-cultural map comparisons.

4. Results

4.1 Quantitative Outcomes

Post-test results confirmed a significant performance advantage for the experimental group across all four FCDI dimensions. Overall post-test means were 3.80 (experimental) and 3.39 (control), yielding a chi-square empirical value of 14.55 against a critical value of 7.81 ($df = 3$, $\alpha = 0.05$), and an efficiency coefficient of 1.12.

Dimension	Ctrl I Pre	Ctrl Post	Exp. Pre	Exp. Post	Exp. Gain
Semantic Accuracy	2.8	3.30	2.79	3.76	+0.97
Pragmatic Approp.	2.7	3.25	2.77	3.71	+0.94
Contextual Precision	2.6	3.41	2.72	3.84	+1.12
Stylistic Sensitivity	2.6	3.59	2.63	3.88	+1.25
Overall Mean	2.7	3.39	2.73	3.80	+1.07

Table 1. Pre-test / Post-test Means and Experimental Group Gains by FCDI Dimension (Scale: 1–5)

The largest experimental gain was observed in the Stylistic Sensitivity dimension ($\Delta = 1.25$), followed by Contextual Precision ($\Delta = 1.12$). This pattern is consistent with the theoretical prediction that explicit cognitive-cultural instruction is particularly effective for the more culturally and contextually determined dimensions of phraseological competence, which are least amenable to rote lexical instruction.



Platform usage analysis revealed that experimental group students completed an average of 6.8 SCM cycles per class session and 122 SCM cycles over the 18-week intervention period. Self-check accuracy (the proportion of initial responses that were correct before Context-check consultation) increased from a group mean of 41% in Week 1 to 74% in Week 18, indicating substantial development of independent phraseological processing competence. Meaning-check reflection quality scores (evaluated by the AI system using a four-point analytic rubric) showed a parallel trajectory, rising from a group mean of 2.1 to 3.6 over the same period.

4.2 Qualitative Findings

Thematic analysis of learner reflective journals and stimulated recall interviews identified three dominant themes:

Theme 1: Cognitive-Cultural Mapping as a Retention and Comprehension Scaffold. Students consistently reported that comparing English and Uzbek phraseological units within shared conceptual domains facilitated both initial comprehension and long-term retention. One learner noted that when realizing a target idiom shared fire imagery with an Uzbek expression for severing relationships, the English unit felt far less foreign and was retained more easily. This aligns with Boers (2011) on mnemonic benefits of etymological transparency in phraseological instruction.

Theme 2: Metacognitive Development Through the SCM Cycle. Students described a progressive shift in their processing strategies across the intervention period, from primarily translation-dependent interpretation (typical of Week 1 protocols) to context-dependent and conceptual-schema-based interpretation (characteristic of Week 18 protocols). The three-stage structure of the SCM model was reported as an important factor in making metacognitive monitoring habitual: Learners reported that by Week 8, the Self-check and Context-check had become automatic habits outside of class — noticing when an expression was unclear and seeking context clues before consulting a dictionary.

Theme 3: AI-Mediated Feedback as a Motivational and Diagnostic Resource. Students valued the immediacy and specificity of AI platform feedback, particularly in contrast to the delayed and generalized nature of traditional instructor feedback on written production tasks. Several students noted that the platform's ability to identify specific FCDI dimension weaknesses — rather than simply marking answers correct or incorrect — helped them direct their self-study efforts more efficiently.

Domain	English Example	Uzbek Equivalent / Parallel	Mapping Type
JOURNEY	Burn one's bridges	Ko'priklarni yoqmoq	Conceptual parallel — different lexical vehicle
ANIMAL	Let the cat out of the bag	Sirni fosh etmoq	No structural parallel — conceptual divergence
WAR	Fight tooth and nail	Barcha kuchini ishga solmoq	Conceptual parallel — different metaphorical vehicle
BODY	Cost an arm and a leg	Juda qimmat turmoq	Conceptual convergence — partial lexical overlap



Domain	English Example	Uzbek Equivalent / Parallel	Mapping Type
FOOD	Bite off more than one can chew	Og'zidan katta luqma olmoq	Near-complete conceptual parallel

Table 2. Sample Cognitive-Cultural Map Entries: English-Uzbek Phraseological Comparison by Domain

5. Discussion

The results of this study converge with and extend existing research in several important directions. The significant performance advantage of the AI-assisted cognitive-cultural mapping group replicates and extends Boers and Lindstromberg's (2008) findings regarding the benefits of cognitive linguistic instruction for phraseological acquisition, and aligns with Godwin-Jones' (2022) review of AI-enhanced language learning outcomes. The specific pattern of gains — with the strongest effects in Stylistic Sensitivity and Contextual Precision — provides new evidence for the theoretical claim that the sociocultural and contextual dimensions of phraseological competence are particularly responsive to cognitively oriented, context-rich instructional approaches.

The qualitative findings add important process-level insights to these quantitative outcomes. The theme of cognitive-cultural mapping as a retention scaffold resonates strongly with Paivio's (1986) dual coding theory and with research on the mnemonic benefits of image schemas in phraseological learning (Boers, 2011). The theme of metacognitive development through the SCM cycle provides further empirical support for the validity of Flavell's (1979) metacognition construct in L2 learning contexts, and specifically extends its application to formulaic language acquisition.

A particularly noteworthy finding concerns the longitudinal development of Self-check accuracy on the idioms-academy.uz platform: the increase from 41% to 74% over 18 weeks provides objective behavioral evidence of the internalization of phraseological processing competence — a process that is notoriously difficult to measure through traditional pre-test / post-test designs alone. This suggests that longitudinal platform usage data can serve as a valuable supplementary assessment tool alongside conventional testing instruments.

The Central Asian context of this study deserves specific attention. Uzbekistani EFL learners face a distinctive set of challenges in phraseological development: significant typological distance between Uzbek (Turkic) and English (Germanic/Indo-European) generates substantial L1 interference at both structural and semantic levels; cultural schemas underlying many English phraseological units are remote from learners' experiential backgrounds; and conventional curricula have historically underemphasized phraseological instruction in favor of grammatical accuracy and reading comprehension. The framework developed in this study is specifically designed to address all three challenges simultaneously, and the positive outcomes achieved suggest its potential for wider application in comparable Central Asian and Turkic-language EFL contexts.

6. Conclusions

This study has demonstrated the effectiveness of a multi-component instructional framework combining cognitive-cultural mapping and AI-assisted reflective learning for developing phraseological competence in Uzbekistani EFL philology students. The key findings are: (1) the combined framework produced significantly superior outcomes compared to conventional instruction across all four FCDI dimensions; (2) cognitive-cultural comparison of English-Uzbek phraseological units within the five conceptual domains facilitated deeper



semantic processing and reduced pragmatic transfer errors; (3) the SCM metacognitive monitoring sequence fostered the development of independent, context-based phraseological processing strategies; and (4) AI-assisted platform feedback provided motivationally and diagnostically valuable individualized support that conventional instruction cannot replicate at comparable scale.

The theoretical contribution of this research includes: the development and validation of the cognitive-cultural comparative mapping framework as a pedagogical tool for cross-linguistic phraseological instruction; the empirical demonstration of metacognitive development through the SCM model; and the integration of TELL affordances within a coherent cognitive-constructivist pedagogical framework grounded in socio-cultural theory.

Practical implications include recommendations for: curriculum developers to incorporate cognitive-cultural comparative tasks systematically into EFL phraseological instruction; teacher educators to train instructors in the cognitive-linguistic analysis of phraseological units; institutional decision-makers to invest in AI-assisted learning platforms that can operationalize metacognitive monitoring at institutional scale; and researchers to conduct cross-contextual replication studies to determine the generalizability of the present framework to other L1 backgrounds and EFL settings.

The AI-assisted reflective learning platform idioms-academy.uz, developed as part of this research program, is currently operational and available to students at partner institutions. Its further development, including the integration of speech recognition for oral phraseological production assessment and the expansion of the cross-linguistic comparative database to include additional L1s (Russian, Chinese, Korean), represents a promising direction for future research and development.

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