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ADAPTIVE AI TOOLS AS DIGITAL SCAFFOLDS FOR EFL WRITING

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Abstract. The strategic digitalization of higher education and the integration of advanced technologies necessitate the development of adaptive pedagogical frameworks. In the context of English as a Foreign Language (EFL) instruction, universities face a critical challenge regarding the pronounced heterogeneity of students' initial language proficiency within mixed-ability classrooms, which significantly complicates individualized writing instruction. This study aims to design, operationalize, and empirically evaluate the “Dynamic Scaffolding” methodology, which systematically integrates generative Artificial Intelligence (AI) tools as adaptive instructional supports to personalize academic writing process for non-linguistic majors. Employing a convergent mixed—methods design, the study triangulated quantitative data from an anonymous 11-items diagnostic survey (5-point Likert scale) administered to 55 first-year undergraduate students (IT, Finance, Information System) at META University with qualitative structural coding of student—authored textual artifacts and sequential learning pathway mapping from prompt reflection journals over an 8-week implementation period. Quantitative survey analysis revealed an overwhelming pedagogical consensus regarding AI's high utility as a structural aid (92.7% agreement) and operational management tool (74.5% agreement). Conversely, critical cognitive limitations

were identified, as students demonstrated substantial uncertainty regarding AI's capacity to facilitate deep content synthesis (56.0%) and independent critical thinking. Textual analysis confirmed sharp improvements in formal mechanical parameters but underscored a persistent need for human instruction in conceptual integration. The study provides a structured, scalable pedagogical model that redefines the division of educational labor, positionally leveraging AI to automate individual mechanical assistance while strategically liberating human instructional time to cultivate higher-order cognitive competencies and authorial voice.

Keywords: Artificial Intelligence in Education, EFL, Academic Writing, Mixed-Ability Classrooms, Dynamic Scaffolding, Personalized Learning, Critical Thinking, Kazakhstan

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EFL ЖАЗУЫН ОҚЫТУДАҒЫ ЦИФРЛЫҚ ТІРЕК РЕТІНДЕГІ БЕЙІМДЕЛГІШ ЖАСАНДЫ ИНТЕЛЛЕКТ ҚҰРАЛДАРЫ

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Аннотация: Жоғары білім беру стратегиялық цифрландыру және озық технологияларды интеграциялау бейімделгіш педагогикалық модельдерді әзірлеуді талап етеді. Ағылшын тілін шет тілі ретінде оқыту (EFL) контекстінде университеттер әртүрлі деңгейде топтарда студенттердің бастапқы тілдік құзареттілігінің айқын әртектілігі мәселесіне тап болады, бұл жазуды жекешелендіріп оқытуды айтарлықтай қиындатады. Бұл зерттеудің мақсаты – тілдік емес мамандықтардың студенттері үшін академиялық жазу процестерін жекешелендіру мақсатында генеративті жасанды интеллект (ЖИ) құралдарын бейімделгіш білім беру тірегі ретінде жүйелі түрде біріктіретін «Динамикалық құрылыс» әдіснамасын жобалау, енгізу және эмпирикалық бағалау болып табылады. Конвергентті аралас

әдістер дизайнын қолдана отырып, зерттеу META университетінің тілдік емес мамандықтарының (IT, Қаржы, Ақпараттық жүйелер) 55 бірінші курс студенті арасында жүргізілген 11 тармақтан тұратын жасырын диагностикалық сауалнаманың (5 балдық Ликерт шкаласы) сандық деректерін 8 апталық оқыту кезеңіндегі промпт-рефлексия журналдарынан алынған студенттік мәтіндік артефактілерді құрымдылық кодтаумен және оқу жолдарының картасымен триангуляциялады. Сандық сауалнама талдауы ЖИ—дің құрымдылық көмекші (92.7% келісім) және формальды талаптарды басқару құралы (74.5% келісім) ретіндегі жоғары тиімділігіне қатысты айқын педагогикалық консенсусты көрсетті. Керісінше, маңызды когнитивті шектеулер анықталды, өйткені студенттер ЖИ—дің терең идеяларды біріктіру (56.0%) және сыни ойлауды дамыту қабілетіне айтарлықтай күмән келтірді. Мәтіндік талдау формальды механикалық параметрлердің айтарлықтай жақсарғанын дәлелдегі, бірақ тұжырымдамалық интеграция үшін адам нұсқаулығының маңыздылығын атап көрсетті. Зерттеу білім беру еңбегінің бөлінісін қайта анықтайтын құрылымдылық, ауқымды педагогикалық модельді ұсынады, мұнда ЖИ механикалық көмекті автоматтандыру үшін қолданылады, бұл оқытушының уақытын жоғары деңгейлі когнитивті құзыреттіліктер мен авторлық даысты дамыту үшін стратегиялық тұрғыдан босатуға мүмкіндік береді.

Түйін сөздер: білім берудегі жасанды интеллект, шет тілі ретіндегі ағылшын тілі, академиялық жазу, аралас қабілеттерге арналған сабақтар, динамикалық оқытуды қолдау, жекешелендірілген оқыту, сыни ойлау, Қазақстан

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АДАПТИВНЫЕ ИНСТРУМЕНТЫ ИИ КАК ЦИФРОВЫЕ КАРКАСЫ ДЛЯ ОБУЧЕНИЯ АНГЛОЯЗЫЧНОМУ ПИСЬМУ

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Аннотация. Стратегическая цифровизация высшего образования и интеграция современных технологий обуславливают необходимость разработки адаптивных педагогических моделей. В условиях преподавания

английского языка как иностранного (English as a Foreign Language, EFL) одной из значимых проблем остается выраженная неоднородность исходного уровня языковой подготовки студентов в разноуровневых группах, что затрудняет персонализированное обучение академическому письму. Цель исследования - разработать, внедрить и эмпирически оценить модель «Динамическая поддержка», предусматривающую системное использование инструментов генеративного искусственного интеллекта в качестве адаптивных цифровых опор при обучении академическому письму студентов нелингвистических образовательных программ. В исследовании применен конвергентный смешанный дизайн, позволивший сопоставить количественные и качественные данные. Количественная часть включала анонимный диагностический опрос из 11 утверждений по пятибалльной шкале Ликерта, проведенный с участием 55 студентов первого курса нелингвистических образовательных программ - IT, «Финансы» и «Информационные системы» - МЕТА Университета. Качественная часть исследования включала структурированное кодирование письменных работ студентов и анализ индивидуальных траекторий обучения на основе рефлексивных журналов работы с промптами в течение восьми недель. Результаты опроса показали высокую степень согласия студентов относительно полезности ИИ как инструмента структурирования письменного текста (92,7%) и соблюдения формальных требований к академическому письму (74,5%). Вместе с тем были выявлены ограничения, связанные с когнитивной составляющей письменной деятельности: 56,0% студентов выразили неуверенность в способности ИИ поддерживать глубокую интеграцию идей и развитие критического мышления. Анализ письменных работ выявил заметное улучшение формальных характеристик текста, одновременно подтвердив сохраняющуюся значимость педагогического сопровождения для концептуальной интеграции, аргументации и развития авторского голоса. На основе полученных результатов предложена структурированная и масштабируемая педагогическая модель, предусматривающая функциональное распределение задач между ИИ и преподавателем: инструменты ИИ используются для автоматизации индивидуальной поддержки при выполнении формализуемых операций, тогда как преподаватель сосредоточивается на развитии критического мышления, смысловой интеграции и самостоятельной письменной позиции студентов.

Ключевые слова: искусственный интеллект в образовании; английский как иностранный язык (EFL); академическое письмо; разноуровневое обучение; динамическая поддержка; персонализированное обучение; критическое мышление

Introduction. The strategic digitalization of education in the Republic of Kazakhstan, formalized in the “State Program for the Development of Education and Science for 2020—2025”, necessitates not only the adoption of new

technologies but also the development of resilient, validated pedagogical models for their curricular integration. A persistent structural challenge in teaching English as a Foreign Language (EFL) within Kazakhstani higher education institutions, particularly to non—linguistic majors, is the pronounced heterogeneity of students' initial language proficiency within the same instructional group (Zhukabayeva et al., 2025). This classroom diversity severely complicates the task of providing individualized support, particularly during the cultivation of complex, integrative productive competencies such as academic writing.

Literature review. Traditional frontal teaching methods frequently prove inadequate for addressing this “mixed ability” paradigm, risking the simultaneous disengagement of both advanced and struggling learners who require completely differentiated intervention strategies. Generative Artificial Intelligence tools, primarily large language models (LLMs) like ChatGPT, offer unprecedented potential for adaptive, immediate, and highly personalized writing assistance (Barrot, 2023; Holmes, Bialik and Fadel, 2019; Zawacki—Richter, 2019; Ranalli, Yamashita and McDonough, 2022). However, their unguided, spontaneous use by students can result in text generation without learning, exacerbating patterns of passive reliance, compromising academic integrity, and inhibiting the development of independent critical thinking and authentic authorial voice (Perkins, 2023; Cotton and Shipway, 2023; Godwin—Jones, 2023). The core problem lies not in technology itself, but in the absence of structured pedagogical frameworks that define how these tools should interact with learners and instructors.

The aim of study is to develop, pilot and systematically evaluate the “Dynamic Scaffolding” methodology. This model is engineered to integrate adaptive AI tools into the writing instruction process for heterogeneous groups, transforming AI from a potential source of academic dishonesty into a controlled pedagogical instrument for personalization. Specifically, the study seeks to answer the following research questions based on empirical data from a student survey:

- In which specific aspects of writing (structural, grammatical, lexical) do students perceive AI tools as most helpful?
- How do students assess the impact of AI on the development of higher—order cognitive skills (critical thinking, source text idea integration)?
- What is the overall perception of the appropriateness and motivational effect of using AI in EFL learning for non—linguistic majors?

Theoretical Framework.

The “Dynamic Scaffolding” methodology is built upon a synthesis of three foundational pedagogical concepts:

1. *Scaffolding in the Zone of Proximal Development (ZPD)* — Grounded in the sociocultural theory of L.S. Vygotski, learning is most effective when supported within the learner's ZPD by a more knowledgeable guide (Vygotski, 1978; Wood, Bruner and Ross, 1976; Kasneci, 2023). In the proposed model, the generative AI tool operates as an interactive, digital scaffolding agent – a temporary, adaptive support structure that can be calibrated in real—time to the user's immediate

linguistic needs and gradually withdrawn (“faded”) as the student’s autonomous competence increases. This approach transitions the classroom from static differentiation (fixed worksheets for different levels) to dynamic personalization.

2. *Project—Based Learning (PBL) for authentic language use* – Academic writing is not taught as an isolated, decontextualized skill but as an essential, goal—directed tool for completing meaningful, project—based tasks (Nasirov, 2025). Within this study, the project required students to write a structured health essay that integrated source text arguments. PBL establishes an authentic rhetorical context that enhances student engagement and motivates the use of AI for strategic problem—solving rather than mere passive text generation.

3. *Digital Literacy and Critical Thinking in the AI Era* – Modern language proficiency is inseparable from the ability to interact critically with AI—generated content. This encompasses “prompt engineering”, source verification, output synthesis, and maintenance of ethical authorship [Seidaliyeva et al., 2025; Chapelle, 2020). The methodology explicitly targets these metacognitive skills, positioning critical thinking not as an incidental byproduct but as a primary learning objective when deploying using AI withing the writing process. Recent literature confirms that AI functions most effectively in education when embedded withing such a structured pedagogical framework.

Recent studies emphasize that AI functions most effectively in education not as a content generator, but as an adaptive support mechanism embedded within a pedagogical framework (Siemens and Baker, 2023).

Materials and methods.

The operational architecture of the model is structured as a cyclical three—stage process where the roles of the student, AI, and instructor are clearly defined and interdependent. The core operational principle is guided agency: students use AI proactively, but within a framework curated by the instructor.

Table 1 — The dynamic Scaffolding Cycle: Stages and Actor Roles

Stage	Student’s core task and prompts to AI	AI’s role (as “Digital Scaffold”)	Role of the instructor
<i>Planning and Structuring</i>	Formulate a topic, thesis statement, and basic essay outline	<i>Generator and Structurer.</i> Upon student request, provides thesis statement options, suggests logical essay structures (e.g. for pros and cons) and helps generate topic—specific academic vocabulary	Teaches students to formulate precise prompts. Provides differentiated tasks: basic outline prompts for weaker students; prompts for counter-argument development for stronger ones
<i>Drafting and Editing</i>	Write a draft, integrating personal ideas and course materials	<i>Interactive tutor.</i> Upon request, explains grammar rules, suggests synonyms, and checks tense consistency. Does not write for the student	<i>Facilitator and Consultant.</i> Conducts small—group workshops, answers content-related questions, holds mini—sessions on common grammar issues identified in drafts



Reflection and Analysis	Analyze personal progress and the AI’s contribution	<i>Object for critique.</i> AI-generated text is used by students for exercises in identifying logical fallacies, cliches, or oversimplifications	<i>Discussion Moderator.</i> Organizes peer-review sessions where students discuss how AI helped or hindered; leads discussions on ethical use
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The pilot study was conducted at META University, Kazakhstan, during the Spring 2026 semester. Participants comprised 55 first—year undergraduate students tracking through non-linguistic majors (Information Technology, Finance, Information Systems). Their baseline English proficiency, evaluated via a localized diagnostic placement test, ranged from A2 to B1 on the CEFR scale, establishing a classic mixed-ability classroom profile. The methodology was implemented over an 8-week cycle withing a compulsory Academic English instructional module. Students completed three core curriculum-aligned tasks AI tools (ChatGPT, Grammarly):

- 1) *Lexical task.* Utilizing structured prompts to fill a comparative table with pros/cons vocabulary related to environmental and lifestyle health factors.
- 2) *Writing task.* Composing a 100-word structured academic essay (What do I need to have good health?) with mandatory integration of concrete arguments from an external text.
- 3) *Grammar task.* Identifying and justifying the use of Present Simple versus Present Continuous in contextual sentences, using AI for explanatory synthesis.

The “Dynamic Scaffolding” model is a structured pedagogical framework designed to strategically integrate AI tools into the EFL writing process to address learner heterogeneity. It moves beyond ad—hoc tool usage to a systematic, stage-based cycle where AI acts as an adaptive, on-demand “digital scaffold” that can be precisely calibrated and faded according to individual learner needs within a Zone of Proximal Development (ZPD) according to Vygotsky (1978). The model is operationalized through a three-phase cycle that defines clear roles for the student, the AI, and the instructor at each stage.

Core Theoretical Foundation: From Static Support to Adaptive Intelligence

Traditional scaffolding in education involves a more knowledgeable guide providing temporary support. The Dynamic Scaffolding model expands this concept by incorporating *Artificial Intelligence as an Interactive Scaffolding Agent*. Its ‘dynamic’ nature stems from two key capabilities:

- 1. **Real-Time Adaptability.** Unlike static worksheets or fixed explanations, an AI like ChatGPT can generate unique explanations, example, and feedback tailored to a student’s specific query, error pattern, or confusion point (Barrot, 2023).
- 2. **Fade-able Support.** The level of guidance provided by the AI is controlled by the sophistication of the student’s prompt. A basic prompt (“write an essay about health”) provides maximum support, while a targeted, meta—cognitive prompt (“improve the topic sentence of my second paragraph to better connect to my thesis”) offers more focused, advanced support, effectively “fading” the scaffold as competency grows.

The three-phase dynamic scaffolding cycle. The model is built around a recursive, three-phase cycle that transforms a writing assignment from an individual task into a guided, AI-mediated learning journey.

Phase 1. Structured Planning and Conceptual Framing.

In this initial phase, the focus is on overcoming the “blank page” challenge and building a coherent framework.

- Student’s role: to analyze the task, generate initial ideas, and formulate strategic prompts to the AI. The goal is not to get a finished product, but to build a blueprint.

- AI’s role (As “Architect and Lexical Consultant”): to generate outlines, propose thesis statements, suggest logical structures (e.g., compare/contrast, problem solution), and provide topic-specific academic vocabulary lists.

- Instructor’s role (as “Prompt Engineer and Differentiator”): to provide “tiered prompt menus”. For A2/B1 students, prompts might be: Generate a basic 5-paragraph outline for an essay on X. For B1+/B2 students, prompts become: “Suggest three counterarguments to the thesis ‘Regular exercise is essential for health’ and provide vocabulary to refute them”. This phase leverages the high student agreement on AI’s help with structure (Q2: 92,7%) and vocabulary (Q1: 87,3%).

Phase 2: Interactive Drafting and Formative Revision.

This phase centers on writing and refining the draft, using AI for real-time, iterative feedback.

- Student’s role: to compose their draft, integrating their own ideas with the planned structure. When stuck, they use AI for discrete, problem—solving queries related to sentence construction, grammar, or paraphrasing.

- AI’s role (as “Interactive Writing Tutor and Grammar Explainer”): to act as a 24/7 writing consultant. When queried, it can: paraphrase awkward sentences, explain why a grammatical tense is used (e.g., the difference between Present Simple for habits vs. Present Continuous for current actions), suggest more concise phrasing, or check cohesion between paragraphs. This directly addresses the areas where students reported significant benefits: grammar help (Q5: 72,7%) and understanding rules (Q6: 69,1%).

- Instructor’s Role (as “Process Analyst and Strategy Coach”): to analyze patterns in the students’ AI queries (collected via shared logs or journals). If many students ask for help with article usage (*a/an/the*), the instructor holds a targeted mini lesson. The instructor shifts from correcting every error to coaching students on how and when to use the AI tool effectively.

Phase 3. Critical Evaluation and Metacognitive Reflection.

This final, crucial phase addresses the key gap identified in the survey: the development of higher order thinking skills.

- Student’s role: to critically evaluate AI’s output and own learning process. They are tasked with identifying weaknesses in an AI-generated paragraph, justifying their edits, and reflecting on their prompt strategy.

- AI's role (as "Object of critique and comparative Benchmark"): Its output is no longer used as an answer key but as a text for analysis. Students might be asked: "Compare the conclusion generated by ChatGPT to the one you wrote. Which is more persuasive and why?" This builds critical thinking (Q7) and idea integration (Q4) skills that students found lacking in passive AI use.

- Instructor's role (as "Evaluator of process and Discussion facilitator"): Assessment is fundamentally redefined. The final grade is based on a "Process Portfolio" comprising:

- 1) The final essay.
- 2) A log of key prompts submitted to the AI and the responses received.
- 3) A reflective narrative explaining the student's choices: *"I asked ChatGPT for synonyms for 'important', but I chose 'crucial' instead of 'paramount' because ..."*
- 4) Participation in peer-review sessions discussing the ethics and efficacy of AI use.

Data Collection Methods (Mixed—Methods Approach):

The study employed a convergent mixed—methods design, triangulating quantitative and qualitative data lines to provide a comprehensive understanding of the intervention's impact. This triangulation addressed the complexity of measuring educational outcomes when integrating a novel, adaptive technology like AI. Quantitative data captured broad behavioral trends and student perceptions, while qualitative data illuminated the underlying processes, strategies, and individual experiences that shaped those perceptions.

Three core data collection methods were deployed:

1. *Diagnostic Survey (Primary Data Source)*. An anonymous post-intervention questionnaire featuring 11 items evaluated on a 5-point Likert scale (1= Strongly Disagree to 5=Strongly Agree). The survey measured student perceptions three primary clusters: Operational/ Structural Efficacy (Q1 — Q3, Q5) Cognitive/ Integrative Impact (Q4, Q6, Q7), and Affective/ Metacognitive Outcomes (Q8— Q10). Internal consistency was validated via a pilot test with a separate cohort (n=10, Cronbach's Alpha > 0/8).

2. *Analysis of Student artifacts*. A comparative, rubric-based evaluation of baseline diagnostic essays (written in week 1 without AI guidance) and final essays (composed through the Dynamic Scaffolding framework) to map developmental trajectories in structural accuracy, grammatical complexity, and source integration.

3. *Analysis of Reflective Meta-Prompts*. Students submitted interaction logs, prompt screenshots, and brief written rationales explaining their editing decisions. This qualitative data underwent structural coding to determine prompt sophistication (ranging from directive to diagnostic), cognitive strategies (verification, solution-seeking, exploration, critical rejection), and sequential learning pathways.

The data retrieved from the post-intervention survey indicates clear, data-driven patterns regarding student perceptions of the AI-integrated learning process. The quantitative results for all 11 dimensions are aggregated in figure 1, indicating

the percentage of positive responses (comprising Agree” and “Strongly Agree” selections).

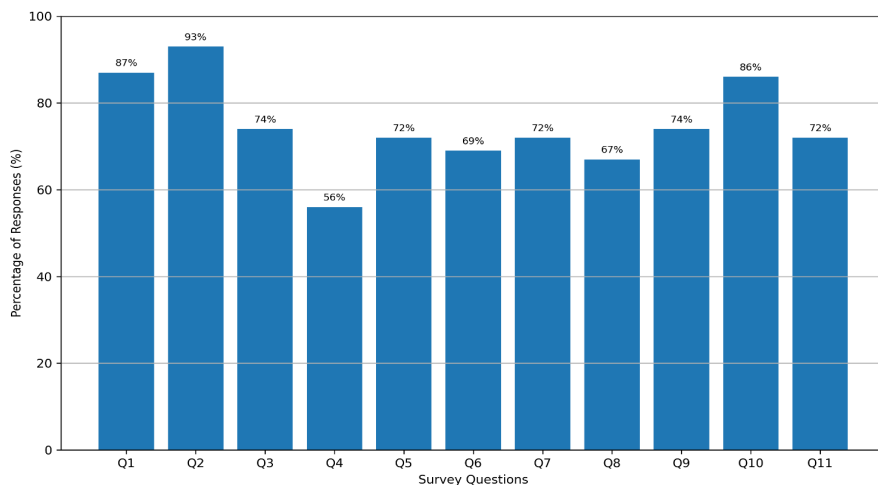


Figure 1 — Students’ perception of AI tools in EFL learning

- Q1: ChatGPT helped formulate questions and vocabulary
- Q2: ChatGPT helped maintain essay structure
- Q3: AI facilitated adherence to requirements (length, logic)
- Q4: AI helped integrate ideas from the text
- Q5: ChatGPT helped identify tenses
- Q6: AI helped deepen understanding of grammar rules
- Q7: AI contributed to the development of critical thinking
- Q8: ChatGPT helped become more independent
- Q9: AI increased motivation to learn English
- Q10: Using ChatGPT is beneficial

The study employed a convergent mixed—methods design, a rigorous approach that triangulates quantitative and qualitative data to provide a comprehensive, nuanced understanding of the intervention’s impact. This methodological triangulation addresses the complexity of measuring educational outcomes when integrating a novel, adaptive technology like AI. Quantitative data captured broad trends and student perceptions, while qualitative data illuminated the underlying processes, strategies, and individual experiences that shaped those perceptions (Nasirov and Eshbayev, 2025; Dwivedi, 2023). The following sections detail the three core methods.

1. Diagnostic Survey: Capturing Perceptual Landscapes.

The cornerstone of the quantitative analysis was a meticulously designed post—intervention diagnostic survey administered anonymously via a secure online platform. The instrument comprised 11 core items, each mapping directly

onto a specific pedagogical objective of the “Dynamic Scaffolding” model. A 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) was selected for its ability to capture the intensity of attitudes and its widespread use in educational research, facilitating data analysis and interpretation.

The survey was deliberately structured to measure perception across a spectrum of competencies, moving from lower—order, mechanical skills to higher—order cognitive and affective outcomes:

- Operational and Structural Efficacy (Q1-Q3, Q5). These items assessed AI’s utility as a functional tool. Q1 (vocabulary/formulation) and Q2 (essay structure) targeted the foundational “scaffolding” function. Q3 (adherence to formal requirements) measured AI’s role in meta—task management. Q5 (tense identification) evaluated its effectiveness as a discrete grammar aid.

- Cognitive and Integrative Impact (Q4, Q6, Q7). This cluster probed the more complex, contested territory of AI’s pedagogical depth. Q4 (idea integration) and Q7 (critical thinking) were intentionally included as critical tests of the model’s ability to foster skills beyond automation. Q6 (deep grammar understanding) sought to distinguish between AI’s capacity for correction versus explanation.

- Affective and Metacognitive Outcomes (Q8—Q10). These questions explored the intervention’s influence on learner psychology and autonomy. Q8 (independence) and Q9 (motivation) measured key drivers of sustained learning. Q10 (overall benefit) served as a summative evaluative judgment, capturing students’ holistic assessment of the tool’s value in their specific learning context.

The selection of this scale and structure was validated by a pilot test with a small cohort (n=10) to ensure clarity and internal consistency (Cronbach’s Alpha > 0/8). The resulting data, presented in Diagram 1, provided a robust statistical map of student perception, forming the primary basis for identifying areas of strong consensus (e.g., structural help) and significant divergence (e.g., critical thinking).

Analysis of student Artifacts: Tracing Development Trajectories.

To move beyond perception and anchor findings in tangible evidence of learning, a systematic comparative analysis of student—authored texts was conducted. This involved the creation of a detailed analytical rubric to code and compare diagnostic essays (written at the module’s outset without AI guidance) and final essays (composed using the “Dynamic Scaffolding” methodology). The rubric focused on three dimensions directly informed by a brief written rationale for each. This method moved the research gaze from outcomes to process, from perception to practice.

The analysis of these meta—prompts involved qualitative coding to identity:

- Prompt Sophistication: Prompts were categorized along a continuum from directive (“Write an essay about health”) to Diagnostic/Specific (“The transition between alternative transitional sentences that better highlight the contrast between physical activity and diet”). This coding revealed the development of students’ “AI literacy” – their ability to use the tool as a precise consultant rather than a general producer.

- **Cognitive Strategy:** The rationales provided insights into students' decision—making processes. Codes emerged such as “Verification” (using AI to check a hypothesis), “Solution—Seeking” (asking for a fix to a known problem), “Exploration” (using open—ended prompts to generate ideas), and “Critical Rejection” (explaining why an AI suggestion was discarded). This directly illuminated the development of the critical thinking skills queried in Q7.

- **Learning Pathway Patterns:** By sequencing the submitted prompts, it was possible to reconstruct individual learning pathways. Some students showed a linear progression from structural to grammatical prompts, while others iterated rapidly between content and form queries. These patterns helped explain variance in the survey responses, linking specific interaction styles with particular perceptual outcomes (e.g., a student who primarily used verification prompts might report high help with grammar but low contribution to critical thinking).

This tripartite methodological design – spanning survey, artifacts, and process reflections – ensured that the study did not rely on a single, potentially flawed, source of evidence. The perceptual data from the survey explained the “what”, the artifact analysis provided the “proof”, and the meta prompt analysis uncovered the “how”. Together, they created a multidimensional portrait of AI integration, capable of informing not only whether the “Dynamic Scaffolding” model works, but, more importantly, *how it works, for whom, and under what conditions*. This depth is essential for translating a pilot study into scalable, adaptable pedagogical guidelines for the broader higher education community in Kazakhstan and beyond.

Results.

The survey results provide clear, data—driven insights into student perception of the AI—integrated learning process.

Students overwhelmingly recognized AI's efficacy as a structural and grammatical aid. A striking 92,7% agreed that ChatGPT helped them follow the essay structure. Furthermore, 74,5% found it helpful in meeting formal requirements like word count and logical connectors. In grammar, 72,7% reported AI aided in tense identification of rules. This aligns with the model's goal of using AI as a scaffold for “how to write”, freeing cognitive resources.

When asked which skills improved most, Writing Skills ranked first (65% of votes), followed by Grammar (58%). Notably, vocabulary acquisition ranked lowest suggesting AI is seen more as a tool for using known words correctly than for discovering new ones. Most significantly, 74,5% of students reported increased motivation to learn English, the highest agreement score for any benefit. This is a powerful indicator of the model's success in enhancing engagement.

The findings align with prior research demonstrating that AI—assisted feedback significantly improves grammatical accuracy and structural coherence in L2 writing (Hyland, 2019; Chapelle, 2020; Siemens and Baker, 2023).

The most revealing finding concerns the limitations of AI. The statements receiving the highest level of disagreement and uncertainty were: “AI helped me integrate ideas from the text” (Q4) and “AI contributed to the development of

my critical thinking” (Q7). For Q7, while 72,7% agreed, a deeper look shows the highest proportion of “fully disagree” responses. This starkly confirms that students intuitively distinguish between AI’s utility for form and its (in)ability to foster deep content synthesis and critical analysis. As one student noted in a reflection, “ChatGPT gives the skeleton, but I have to put in the brain and the heart”.

The ultimate indicator of acceptance is Q11: “Using ChatGPT is appropriate for non—linguistic majors”. Here, 72,7% agreed (with a remarkable 54,5% fully agreeing). This represents a strong mandate from students for the formal, guided integration of AI into the curriculum.

Below is figure 2 that visualizes this cycle, integrating the key quantitative findings from your survey directly into the model’s stages. This visual shows where in the process the student—perceived strengths and challenges are located.

This diagram shows a recursive loop. Feedback and reflection from one cycle directly inform and elevate the next task, creating an upward spiral of competency. The key challenge (Stage 4) is systematically addressed by instructor feedback (Stage 5), which is informed by the very survey results highlighted in the diagram.

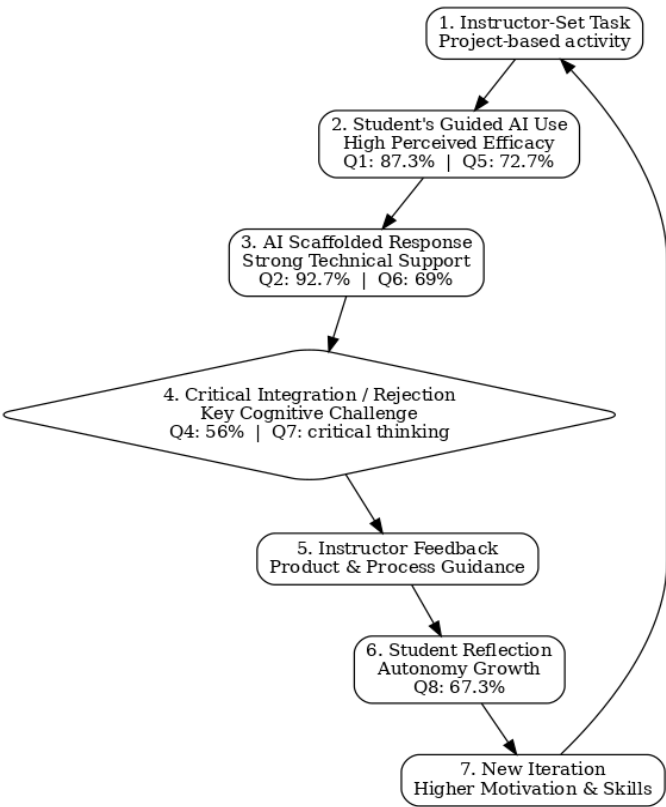


Figure 2 —Dynamic Scaffolding Cycle

Discussion. The study relies on self—reported perception data. While motivation and perceived learning are important, longitudinal studies measuring actual proficiency gains are needed. The risk of “prompt dependency” – where students struggle to write without AI cues—requires further investigation.

The model directly addresses key ethical issues:

1. Academic integrity – By requiring a “process portfolio” (prompts reflections), assessment shifts from solely evaluating the final product to evaluating the learning journey, making plagiarism transparent. Academic integrity considerations in the AI—mediated classroom require transparent assessment models and process—oriented evaluation (Perkins, 2023; Cotton and Shipway, 2023).

2. Data Privacy – The use of institutional accounts and clear guidelines on not sharing personal data was emphasized.

3. Cognitive Dependency – The scaffolding is designed to be faded. Future iterations will include mandatory “AI—off” tasks to ensure core competency development.

Thus, this loop creates a virtuous cycle of increasingly sophisticated tool use. The model institutionalizes transparency, making the learning process visible and assessable, thereby directly mitigating ethical concerns about academic integrity. By systematically channeling AI’s strengths toward personalized support for mechanical tasks, it strategically reallocates human instruction toward fostering the analytical and creative competencies that define true proficiency.

Conclusion. The “Dynamic Scaffolding” methodology, as piloted and evaluated through this study, presents a viable and effective framework for harnessing the power of adaptive AI tools in the heterogeneous EFL classroom. The data conclusively shows that students perceive AI as a highly appropriate, motivating and effective “digital assistant” for mastering the structural and grammatical mechanics of writing, a finding strongly supported by the overwhelming agreement on its utility for essay structure and task compliance. Simultaneously, the data serves as a critical reminder: AI is not a substitute for pedagogical expertise. Its greatest value is in automating the scalable, personalized support of lower—order skills, thereby creating the essential instructional space and cognitive bandwidth, thereby enabling the instructor to focus their irreplaceable human role on guiding the development of higher—order cognitive skills – critical thinking, deep analysis, creative synthesis, and ethical reasoning – which students correctly identify as areas where AI’s contribution is limited or non—existent, as evidenced by the significant uncertainty and disagreement regarding AI’s role in idea integration and critical thinking development. Therefore, the model’s success lies not in the technology itself, but in this intentional division of labor: AI manages the *how* of writing with precision and patience, while the expert educator cultivates the *why* and the *what* — the intellectual depth and authorial voice that define meaningful communication.

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