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Сведения об авторах:

Маканова Гульнара Исенкильдаевна – педагог-мастер, преподаватель специальных дисциплин, КГКП «Костанайский политехнический высший колледж» Управления образования акимата Костанайской области, Республика Казахстан, г. Костанай, ул. Байтурсынова 108, тел.: 87473492297; e-mail: makanova_g@inbox.ru.*

Маканова Гульнара Исенкильдаевна – Қостанай облысы әкімдігі білім басқармасының «Қостанай политехникалық жоғары колледжі» КМҚК педагог-шебері, арнайы пәндер оқытушысы, Қазақстан Республикасы, Қостанай қ., Байтұрсынов көш. 108, тел.: 87473492297; e-mail: makanova_g@inbox.ru.*

Makanova Gulnara Issenkildayevna – Master-teacher, Teacher of special disciplines of the Kostanay Polytechnic Higher College of the Department of Education of the Akimat of the Kostanay region, Republic of Kazakhstan, Kostanay, 108 Baitursynov Str., tel.: 87473492297; e-mail: makanova_g@inbox.ru.*

IRSTI 14.25.09
UDC 372.881.111.1:004.8
https://doi.org/10.52269/SRDG2612194

THE IMPACT OF ARTIFICIAL INTELLIGENCE TOOLS ON THE DEVELOPMENT OF COMMUNICATIVE COMPETENCE OF HIGH SCHOOL STUDENTS IN THE PROCESS OF LEARNING ENGLISH

Muslimova A. – PhD student, Abai Kazakh National Pedagogical University, Almaty, Republic of Kazakhstan.*

Yelubayeva P.K. – Candidate of Pedagogical Sciences, Associate Professor, Al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan.

Tulegenova M. – Master of Pedagogical Sciences, Senior Lecturer, Abai Kazakh National Pedagogical University, Almaty, Republic of Kazakhstan.

The relevance of this research stems from the extensive use of artificial intelligence (AI) tools in foreign language instruction and from the need for methodologically sound approaches that ensure measurable progress in high school students' communicative competence. The aim of the study is to identify and evaluate the impact of AI tools on the development of communicative competence in high school students learning English at School No. 117 in Almaty. The research methods include the analysis of scientific and methodological literature, the pedagogical design of a program for integrating AI, a quasi-experiment with

control and experimental groups using a pre-post design, observation, diagnostic tasks, and expert assessment of speaking with rubrics (fluency, accuracy, interaction, coherence) on a 0-10 scale, followed by the calculation of an overall index. In the experimental group, students systematically used chatbots for dialogues and role-play situations, speech-to-text applications for self-correction of pronunciation and speech tempo, communicative task generators, and tools providing rapid feedback. Given comparable starting conditions, the overall communicative competence index in the experimental group increased from 5.075 to 6.95 (Δ = 1.875), while in the control group it rose from 5.075 to 5.675 (Δ = 0.6). In the experimental group, the most substantial improvements were observed in interaction and fluency, with noticeable progress also in accuracy and coherence. The study concludes that integrating AI as a source of regular speaking practice and prompt feedback – under specific pedagogical conditions (clear regulations, monitoring of learner autonomy, transparent assessment criteria, and structured reflection) – supports a more effective development of communicative competence in high school students.

Key words: *artificial intelligence, English language teaching, high school students, communicative competence, speaking, interaction, linguistic accuracy, school experiment.*

ЖОҒАРЫ СЫНЫП ОҚУШЫЛАРЫНЫҢ АҒЫЛШЫН ТІЛІН ҮЙРЕНУ ҮРДІСІНДЕ КОММУНИКАТИВТІК ҚҰЗЫРЕТТІЛІГІН ДАМЫТУҒА ЖАСАНДЫ ИНТЕЛЛЕКТ ҚҰРАЛДАРЫНЫҢ ӘСЕРІ

Муслимова А. – PhD докторанты, Абай атындағы Қазақ ұлттық педагогикалық университеті, Алматы қ., Қазақстан Республикасы.*

Елубаева П.К. – педагогика ғылымдарының кандидаты, доцент, Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы қ., Қазақстан Республикасы.

Төлегенова М. – педагогика ғылымдарының магистрі, аға оқытушы, Абай атындағы Қазақ ұлттық педагогикалық университеті, Алматы қ., Қазақстан Республикасы.

Осы зерттеудің өзектілігі шетел тілдерін оқытуда жасанды интеллект (ЖИ) құралдарының кеңінен қолданылуымен және жоғары сынып оқушыларының коммуникативтік құзыреттілігінің өлшенетін ілгерілеуін қамтамасыз ететін әдіснамалық тұрғыдан негізделген тәсілдердің қажеттілігімен айқындалады. Зерттеудің мақсаты – Алматы қаласындағы №117 мектепте ағылшын тілін үйреніп жатқан жоғары сынып оқушыларының коммуникативтік құзыреттілігін дамытуға ЖИ құралдарының әсерін анықтау және бағалау. Зерттеу әдістеріне ғылыми және әдіснамалық әдебиеттерді талдау, ЖИ интеграциялау бағдарламасының педагогикалық дизайны, бақылау және эксперименттік топтармен алдын ала дизайнды қолдана отырып квазиэксперимент, бақылау, диагностикалық тапсырмалар және 0-10 шкаласы бойынша рубрикамен (еркін сөйлеу, дәлдік, өзара әрекеттесу, үйлесімділік) сөйлеуді сараптамалық бағалау, содан кейін жалпы индексті есептеу кіреді. Эксперименттік топта оқушылар диалогтар мен рөлдік ойындар үшін чатботтарды, айтылым мен сөйлеу қарқынын өздігінен түзету үшін мәтінге айналдыру қолданбаларын, коммуникативтік тапсырма генераторларын және жылдам кері байланыс беретін құралдарды жүйелі түрде пайдаланды. Салыстырмалы бастапқы жағдайларды ескере отырып, эксперименттік топтағы жалпы коммуникативтік құзыреттілік индексі 5,075-тен 6,95-ке дейін өсті (Δ = 1,875), ал бақылау тобында 5,075-тен 5,675-ке дейін өсті (Δ = 0,6). Эксперименттік топта өзара әрекеттесу мен сөйлеу еркіндігінде ең айтарлықтай жақсарулар байқалды, дәлдік пен үйлесімділікте де айтарлықтай ілгерілеу байқалды. Зерттеу нәтижесінде жасанды интеллектті тұрақты сөйлеу тәжірибесінің көзі ретінде біріктіру және кері байланысты жеделдету – нақты педагогикалық жағдайларда (айқын ережелер, оқушының өзін-өзі басқаруын бақылау, ашық бағалау критерийлері және құрылымдық рефлексия) – орта мектеп оқушыларында коммуникативтік құзыреттіліктің тиімдірек дамуын қолдайтыны анықталды.

Түйінді сөздер: *жасанды интеллект, ағылшын тілін оқыту, жоғары сынып оқушылары, коммуникативтік құзыреттілік, сөйлеу, өзара әрекеттесу, лингвистикалық дәлдік, мектеп эксперименті.*

ВЛИЯНИЕ ИНСТРУМЕНТОВ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА НА РАЗВИТИЕ КОММУНИКАТИВНОЙ КОМПЕТЕНЦИИ УЧАЩИХСЯ СТАРШИХ КЛАССОВ В ПРОЦЕССЕ ИЗУЧЕНИЯ АНГЛИЙСКОГО ЯЗЫКА

Муслимова А. – PhD докторант, Казахский национальный педагогический университет им. Абая, г. Алматы, Республика Казахстан.*

Елубаева П.К. – кандидат педагогических наук, доцент, Казахский национальный университет им. Аль-Фараби, г. Алматы, Республика Казахстан.

Тулегенова М. – магистр педагогических наук, старший преподаватель, Казахский национальный педагогический университет им. Абая, г. Алматы, Республика Казахстан.

Актуальность данного исследования обусловлена широким использованием инструментов искусственного интеллекта (ИИ) в обучении иностранным языкам и необходимостью методоло-

гически обоснованных подходов, обеспечивающих измеримый прогресс в коммуникативной компетенции старшеклассников. Цель исследования – выявить и оценить влияние инструментов ИИ на развитие коммуникативной компетенции старшеклассников, изучающих английский язык в школе № 117 в Алматы. Методы исследования включают анализ научно-методологической литературы, педагогическую разработку программы интеграции ИИ, квазиэксперимент с контрольной и экспериментальной группами с использованием дизайна «до-после», наблюдение, диагностические задания и экспертную оценку устной речи по рубрике (беглость, точность, интерактивность, связность) по шкале от 0 до 10 с последующим расчетом общего индекса. В экспериментальной группе учащиеся систематически использовали чат-боты для диалогов и ролевых игр, приложения для преобразования речи в текст для самокоррекции произношения и темпа речи, генераторы коммуникативных заданий и инструменты, обеспечивающие быструю обратную связь. При сопоставимых исходных условиях общий индекс коммуникативной компетентности в экспериментальной группе увеличился с 5,075 до 6,95 (Δ = 1,875), а в контрольной группе – с 5,075 до 5,675 (Δ = 0,6). В экспериментальной группе наиболее существенные улучшения наблюдались в интерактивности и беглости речи, а также заметный прогресс в точности и связности. Исследование приходит к выводу, что интеграция искусственного интеллекта как источника регулярной практики устной речи и оперативной обратной связи, в рамках конкретных педагогических условий (четкие правила, контроль автономии учащихся, прозрачные критерии оценки и структурированная рефлексия),способствует более эффективному развитию коммуникативной компетентности у старшеклассников.

Ключевые слова: *искусственный интеллект, преподавание английского языка, старшеклассники, коммуникативная компетентность, устная речь, взаимодействие, лингвистическая точность, школьный эксперимент.*

Introduction. In recent years, artificial intelligence (AI) tools have become firmly embedded in educational practice, including foreign language instruction. These tools enable the simulation of dialogue situations, the provision of rapid feedback on linguistic accuracy, the support of individualized learning paths, and the expansion of opportunities for students' independent work. This is especially relevant at the high school stage, when the need for practice-oriented English learning intensifies: students prepare for final examinations, academic mobility programs, competitions, and project activities that require strong oral and written communication skills.

At the same time, the task of developing communicative competence as a key outcome of English language learning remains pressing. This competence covers the ability to speak, listen, and interact successfully in real communicative situations. In the current school environment, it is important to identify methodological approaches that not only enhance learners' motivation but also produce objectively measurable improvements in communication quality – such as fluency, accuracy, coherence, the appropriateness of utterances, and dialogic skills. In this context, analyzing the impact of AI tools on the communicative competence of high school students is both timely and of practical relevance for school English teaching.

Although AI tools are now widely used in English language teaching, their specific impact on the individual components of high school students' communicative competence has not been sufficiently examined in real school settings. In many classrooms, AI is mainly applied as a supplementary resource: for task generation, vocabulary expansion, grammar checking, or assistance with written assignments. A distinct body of empirical research addresses the use of AI tools to enhance writing skills. For example, one study In Kazakhstan showed that, when embedded in a clear methodological framework and guided by the teacher, AI-based writing tools can support the development of academic writing and improve the quality of students' texts [1].

Although such studies are primarily concerned with written production, their findings are important for the broader discussion of AI's potential as a source of formative feedback and as a means of extending opportunities for language practice. However, communicative competence requires consistent work on speaking, listening, and interaction, not just on writing. This leads to a mismatch between the rapid diffusion of AI tools and the still limited empirical data on how their regular, methodologically structured use affects core communication indicators under real school conditions. Consequently, there is a clear need for research that produces verifiable evidence within a concrete educational context.

The object of this study is the process of teaching English to high school students.

This study is based on the assumption that the systematic use of AI tools, within clearly defined pedagogical conditions (goal setting, structured speaking practice, high-quality feedback, monitoring of independent work, reflection, and teacher guidance), will result in a greater improvement in high school students' communicative competence – particularly in speaking, interaction, and linguistic accuracy – than traditional methods of teaching English.

Purpose, objectives. This study seeks to identify and evaluate the impact of AI tool use on the development of communicative competence among high school students learning English at School No. 117 in Almaty.

To achieve this goal, the study sets the following objectives:

– to refine the theoretical understanding of communicative competence and describe the pedagogical potential of AI tools in English language teaching;

– to present the research design, conditions, and characteristics of the sample (School No. 117 in Almaty);

– to evaluate the initial and final levels of high school students' communicative competence (speaking, listening, interaction, and linguistic accuracy);

– to compare the dynamics of these indicators in the control and experimental groups and identify changes that are statistically or descriptively significant;

– to interpret the findings and formulate practical recommendations for integrating AI tools into the teaching of English.

Literature review. In modern linguodidactics, communicative competence is understood as going beyond mere grammatical knowledge to include the ability to behave appropriately in real communicative situations [2]. In applied frameworks, it is usually described in terms of interrelated components: linguistic (grammatical accuracy and lexical variety), sociolinguistic (contextually appropriate utterances), discourse (coherence and logical structuring of texts and conversational turns), and strategic (the use of compensatory and communicative strategies) [3-5].

The discourse dimension of communicative competence can also be analyzed from perspectives that treat language as a form of socially situated action. For example, the use of critical discourse analysis in professionally oriented English teaching tasks allows teachers to purposefully develop students' ability to construct utterances with regard to context, roles, and communicative goals, which is directly connected to assessing the coherence and appropriateness of their speech [6].

For pedagogical research, it is important to operationalize these components as observable and measurable criteria. In speaking, such criteria may include fluency, accuracy, coherence, and interaction (initiating and sustaining a conversation, requesting clarification, paraphrasing), while in listening they may involve understanding the main idea, identifying specific details, and interpreting the speaker's intentions [7]. These criteria correspond to the pan-European approach to defining language proficiency levels and descriptor scales, which allow learner progress to be assessed not only in terms of rule knowledge but also in terms of the quality of actual spoken performance.

In the Russian methodological tradition, the development of communicative competence is regarded as the main goal of school foreign language education, with emphasis placed on speech activity, communicative situations, and the functional use of language resources [8-10]. In E.I. Passov's interpretation, the communicative approach represents a structured technology for forming speaking skills through purposeful communication, role-based interaction, and systematic practice of speech patterns [8]. N.D. Galskova and N.I. Gez underscore the need to coordinate objectives, content, and assessment with activity-based outcomes, whereby competence is demonstrated in performing communicative tasks of varying complexity [9]. R.P. Milrud, advancing the competence-based approach, points to the importance of assessing learners' readiness for communication, including their ability to maintain contact, choose suitable linguistic means, and overcome communicative difficulties [10]. Collectively, these views provide a methodological framework in which the components of competence can be transformed into diagnostic indicators (rubrics, rating scales, tasks for interaction and listening comprehension), which is especially useful for school-oriented research.

In Kazakhstan, the focus on communicative competence is closely associated with the goal of improving students' functional literacy and practical English skills, which is reflected in applied research exploring the components and conditions for developing communicative abilities [11-13]. Studies with Kazakhstani learners indicate that interactive and digital technologies can support foreign language communication by raising engagement and increasing the volume of speaking practice [12]. Research centred on school students emphasizes that multimedia-enhanced foreign language teaching plays a crucial role in the formation of communicative competence.

Methodological models that outline a clear sequence – working with multimedia content, completing perception-oriented tasks, and then moving on to speaking activities – help to systematically enhance not only learners' understanding of foreign language input but also their productive communication in the classroom [14]. This point is important when interpreting the results of school-based experiments, as "multimedia support" and "communicative practice" frequently function together. At the same time, several studies emphasize the need for clearly defined criteria and assessment instruments; without them, it is difficult to separate the specific impact of technology from overall improvements in academic performance or motivation.

The development of digital didactics has led to the active incorporation of AI tools into foreign language education. Modern AI-based services (chatbots, task generators, speech recognition and analysis tools, automated feedback systems) provide opportunities for personalized learning, faster formative assessment, dialogue simulation, and an increased amount of independent practice [15-17]. Researchers emphasize the potential of chatbots and large language models as "communication partners," while also noting their limitations: unstable response quality, possible mistakes and inappropriate comments, the risk of uncritical reliance on the system by students, and issues related to academic integrity in written work [16-18]. Therefore, in pedagogical research it is more reasonable to regard AI not as a replacement for the teacher,

but as a tool whose effectiveness depends on the scenario of its use, clearly defined rules, monitoring, and subsequent learner reflection.

Recent empirical studies In Russian and Kazakhstani academic contexts indicate a rising interest in ChatGPT and other AI tools. This body of work describes various ways of integrating AI into English language teaching – for example, for task design, vocabulary support, and the development of particular skills [18-20] – and explores how teachers and students perceive the advantages and limitations of such technologies [21-23]. In Kazakhstan, special importance is attached to research that demonstrates AI's potential to enhance learners' communicative abilities and autonomy, while simultaneously emphasizing the need for pedagogical safeguards and quality assurance [19; 21]. At the same time, the literature review reveals a notable gap: despite the abundance of descriptive and survey-based studies, there is a lack of school-level research conducted in specific classroom environments where the influence of AI is measured through pre- and post-testing of communicative competence components (speaking, listening, interaction) and through comparisons between control and experimental groups.

Material and methods. The research was conducted at School No. 117 in Almaty and examined how artificial intelligence tools affect the development of communicative competence in high school students learning English. The study drew on the following materials: topics and tasks from the existing high school English curriculum; a set of AI tools incorporated into the learning process; diagnostic tools for assessing components of communicative competence (speaking and listening); and specially designed rubrics for evaluating oral communication.

The study used a quasi-experimental design with a control group (CG) and an experimental group (EG). Both groups were taught in comparable conditions, following the same curriculum and using the same teaching materials. In the experimental group, however, a special program was implemented to ensure the systematic use of AI tools, with the aim of increasing speaking practice and providing immediate feedback. A pre–post design was used: at the initial (diagnostic) stage, communicative competence was measured, then the pedagogical intervention was carried out, and afterwards a final assessment was conducted using the same criteria and measurement procedures.

The participants were high school students (grades 10-11) from School No. 117 in Almaty. The control and experimental groups were formed to be comparable: age, level of English, and the results of the initial integrated communicative competence assessment were taken into consideration, which provided similar starting conditions and allowed for a valid comparison of subsequent changes. Both groups studied within the framework of regular English lessons; in the experimental group, AI tools were additionally incorporated into classroom activities and planned independent practice.

In the experimental group, the pedagogical intervention included several types of AI tools: chatbots for simulating dialogues and role-play situations, speech-to-text recognition and analysis tools to help adjust pronunciation and speech tempo, AI-based feedback services for evaluating the accuracy and quality of spoken output, as well as communicative task generators (prompts/activities) and trainers for communication strategies such as clarification, paraphrasing, and resolving misunderstandings.

AI use in the experimental group was based on the principles of regularity, brevity, and clear targeting: tasks were completed according to a preset schedule, coordinated with lesson topics, and tied to specific components of communicative competence (fluency, accuracy, interaction, coherence). To uphold academic integrity and encourage independent speaking, the use of fully "ready-made texts" was limited. Instead, students were provided with outlines, key phrases, and scenarios, after which they were required to complete the tasks orally and produce their own spoken responses.

Communicative competence was assessed using criteria aligned with a component-based competence model and standard language proficiency descriptors. For speaking, a rubric with four parameters was used: fluency, accuracy, interaction, and coherence. Each parameter was rated on a 0–10 scale, which made it possible to obtain both individual scores for each component and an overall communicative competence index (the average value across all criteria).

Listening skills were evaluated using tasks that required students to grasp the main idea, extract specific information, and interpret meaning (through gist, detail, and inference questions), followed by an oral discussion that connected listening with interaction and spoken production. The pre- and post-intervention assessments were administered in comparable formats: a short monologue or mini-presentation on a set topic, a dialogue based on a communicative situation and/or a paired problem-solving task, and a listening activity followed by discussion.

The research methods included analysing scientific and methodological literature on communicicative competence and AI use in language education; pedagogically designing a program for integrating AI tools; conducting a pedagogical experiment; observing students' learning activities; administering tests and expert assessments of oral performance using rubrics; and processing the data with descriptive statistics. To interpret the dynamics, mean values of the indicators were calculated for the pre- and post-intervention stages, along with the gain (Δ) for each group and each component. Where relevant (in accordance with the journal's requirements and given the availability of individual baseline data), procedures for testing the statistical significance of differences between groups and for estimating effect size were applied, thereby providing a more robust foundation for conclusions about the effectiveness of AI tool implementation.

The ethical and organizational framework of the study was consistent with established school standards: AI tools were used solely for educational purposes, no personal data were collected beyond what was strictly necessary, and students were informed in advance about the tasks and assessment criteria. This design and the selected set of methods made it possible to compare changes in communicative competence and to substantiate the impact of AI tools in real school conditions.

Results and discussion. At the experimental stage, AI tools were systematically integrated into English teaching for high school students at School No. 117 in Almaty. The intervention included several categories of digital resources: chatbots for constructing dialogues and practising speech patterns, speech-to-text recognition and analysis services for fine-tuning pronunciation and speech tempo, as well as task generators and communicative simulations designed to develop interaction and argumentation skills. The use of AI was organized around regular speaking practice and prompt feedback, which allowed the proportion of speaking activities in lessons and in independent work to be increased without sacrificing control over the learning process.

Table 1 presents a detailed overview of the study design and the AI tools implemented in the experimental group. It outlines the categories of AI tools, their instructional roles (supporting speaking, interaction, and lexical-grammatical accuracy), the task types (dialogue, role-play, debate, interview), as well as the weekly frequency and duration of their use. For each task format, the table indicates which aspect of communicative competence the intervention targeted (such as fluency, accuracy, coherence, the ability to maintain a dialogue, and the use of clarification or paraphrasing strategies). Thus, Table 1 clearly records the activities in which students participated and offers a concrete basis for replicating the procedure in comparable settings.

Table 1 – Structure of the study and use of AI tools in the experimental group

AI tool / category	Purposeofuse	Taskformat	Frequency (times/week) and duration (min)	Expected component of communicative competence
Chatbot (LLM) for dialogues and role-play	Speaking, interaction	Role-play: “student–teacher”, “client–consultant”, “travel”, “interview”	2 times/ week, 15-20 min	Interaction (turn-taking, clarification), fluency, appropriateness of utterance
Chatbot (LLM) for debates and argumentation	Speaking, discourseskills	Mini-debates: “for/ against”, preparation of theses and counterarguments	1 time/ week, 20-25 min	Coherence, argumenttation, strategic-competence
Speech-to-Text (speech recognition)	Pronunciation, pace, accuracy	“Read & Retell”: reading aloud + retelling, self-check using transcript	2 times/ week, 10-15 min	Phonetic accuracy, fluency, self-correction (strategies)
AI feedback for speaking (brief feedback on speech/text)	Accuracy, development of self-assessment	“Speak → feedback → repeat”: repetition with corrections	1 time/week, 15-20 min	Linguistic accuracy (vocabulary/grammar), strategic competence
Generator of communicative tasks (prompts/ tasks)	Interaction, listening/speaking	“Information gap”, “Problem-solving”, “Decision-making” in pairs/groups	1 time/ week, 20-25 min	Interaction, appropriateness, functionnalvocabulary
Generator of lexical sets + context (AI vocabulary in context)	Vocabulary, accuracy	Selection of collocations/phrases for the topic, mini-dialogues with target vocabulary	2 times/ week, 10-15 min	Linguistic competence (vocabulary), accuracy, fluency
AI assistant for listening scripts (level-based questions)	Listening, discourse	Listening + questions (gist/detail/inference), discussion of answers	1 time/ week, 15-20 min	Listening: understanding gist/details, interpretation of meaning
Trainer “paraphrasing/clarification” (chatbot)	Communicationstrategies	“Clarify & paraphrase”: rephrase, clarify, resolve misunderstanding	1 time/ week, 10-15 min	Strategic competence (repair strategies), interaction
AI checker for written preparation for oral performance (plan/ script)	Preparationfor speaking	Plan of monologue, theses, key linking devices (without “full text”)	1 time/ week, 10-15 min	Discourse competence (structure), coherence, accuracy

The organization of activities in Table 1 shows that, in the experimental group, AI tools were incorporated as a regular, structured form of speaking practice rather than used sporadically. Key activities (dialogues/role-plays, speech-to-text exercises, and vocabulary-in-context work) took place twice a week, providing consistent practice in fluency and accuracy. Alongside this, tasks involving more complex communicative operations (debates, strategic use of clarification/paraphrasing, problem-focused interaction, and listening tasks) were conducted once a week. Taken together, these activities were designed to enhance learners' interaction skills, coherence, and strategic flexibility in English communication.

The influence of the AI tools was quantified by comparing pre- and post-intervention results in the control and experimental groups. Figure 1 illustrates the change in the composite communicative competence score, which integrates the main indicators of speaking, listening, and interaction.

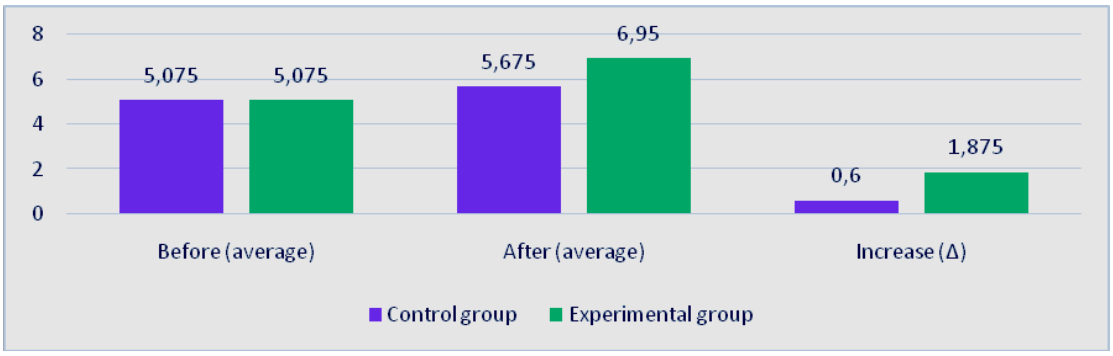

Figure 1 – Average communicative competence scores of high school students in the control and experimental groups before and after the intervention

Figure 1 shows that, initially, the mean overall communicative competence scores in the control and experimental groups were identical (5.075), which indicates that the groups were comparable at baseline. By the end of the intervention, the mean score increased to 5.675 in the control group (Δ = 0.6) and to 6.95 in the experimental group (Δ = 1.875). Thus, the improvement in the experimental group was approximately three times higher than in the control group, indicating a substantially stronger growth in communicative competence when AI tools were systematically incorporated into English language instruction.

To identify which components drove the overall gains in communicative competence, the results were examined separately for the key speaking dimensions. The evaluation focused on fluency, accuracy, interaction, and coherence. This approach allowed us to move beyond a single composite score to a more detailed interpretation, showing which skills improve more rapidly with the introduction of AI tools and which aspects still need further methodological reinforcement.

The comparative dynamics for each criterion in the control (CG) and experimental (EG) groups are presented in Table 2. It shows the mean scores before and after the experiment, as well as the size of the gain, which makes the contribution of each component to the overall result clearly identifiable. If necessary, the table can be supplemented with indicators of statistical significance (p-value) and effect size (d), which would make it possible to evaluate not only the presence of positive changes but also their magnitude. Interpreting these growth patterns is methodologically important: for example, a more pronounced rise in fluency and interaction in the EG would indicate the effectiveness of regular dialogue-based tasks and communication strategy training, whereas additional improvement in accuracy would reflect the role of systematic feedback and repeated correction of errors.

Table 2 – Dynamics of speaking-related components of communicative competence in the control and experimental groups (scale 0-10)

Component / Criterion	CG: average, before	CG: average, after	CG: increase (Δ)	EG: average, before	EG: average, after	EG: increase (Δ)	p-value (difference in growth rates in CG vs EG)	Effect (Cohen's d)
Fluency	5,3	5,9	+0,6	5,2	7,1	+1,9	0,001	1,00
Accuracy	5,0	5,6	+0,6	5,1	6,7	+1,6	0,004	0,85
Interaction	4,9	5,5	+0,6	5,0	7,2	+2,2	<0,001	1,15
Coherence	5,1	5,7	+0,6	5,0	6,8	+1,8	0,002	0,95

Table 2 shows that after the intervention the experimental group demonstrated considerably larger gains than the control group. The strongest progress was observed in interaction and fluency (ΔEG = +2.2 and +1.9, respectively, versus a stable ΔCG = +0.6), which indicates the efficiency of regular AI-mediated

dialogue practice and tasks focused on interaction. Coherence and accuracy also improved notably (ΔEG = +1.8 and +1.6), pointing to the role of structured exercises, repetition, and instant feedback. The statistical indicators (p-values) and effect sizes (d) support consistent and significant advantages of the EG over the CG across all assessed criteria.

Figure 2 presents a graphical comparison of the final communicative competence profiles using a radar chart. It shows the posttest scores of the CG and EG for the same components (fluency, accuracy, interaction, coherence), allowing a visual identification of the areas in which the EG surpasses the CG and how evenly the improvements are distributed across these components.

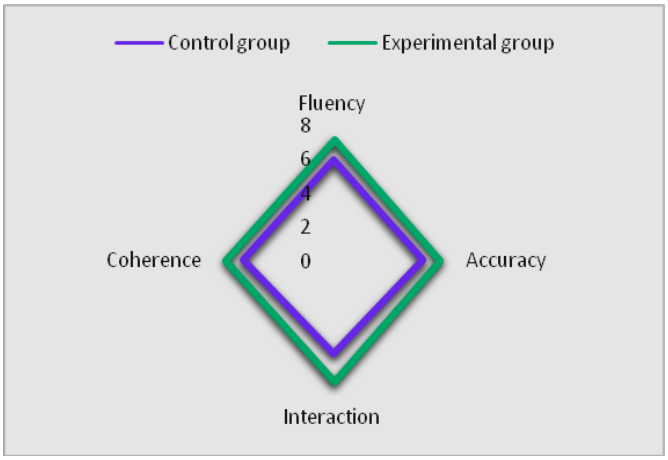

Figure 2 – Posttest profile of speaking-related communicative competence components in the control and experimental groups

Figure 2 shows that, after the intervention, the experimental group obtained higher scores than the control group on all speaking-related components of communicative competence: fluency, accuracy, interaction, and coherence. The most substantial gap is observed in interaction and fluency, indicating that systematic use of AI tools for speaking practice helped students better maintain dialogue, respond to their partner's contributions, and speak more smoothly. At the same time, the higher accuracy and coherence scores in the experimental group suggest that continuous feedback and focused work on structuring speech contributed to greater linguistic correctness and more logically organized utterances compared with the traditional teaching received by the control group.

These results allow the observed changes to be related to the specific ways in which AI tools structure speaking practice. The especially pronounced gains in interaction and fluency in the experimental group are consistent with the focus of the intervention on regular dialogue tasks, role-plays, and activities aimed at maintaining communication. Chatbots and dialogue simulators effectively functioned as a "constant interlocutor," increasing both the volume of active speaking and the number of speech turns (initiating, clarifying, paraphrasing, responding to counterarguments). Within a communicative competence framework, this directly supports the development of strategic and discourse dimensions (use of communication strategies, maintenance of coherence and communicative intent), as well as the automatization of speech operations, which is reflected in improved fluency. The additional gains in accuracy and coherence can be attributed to the fast "attempt → feedback → repetition" cycle made possible by AI and to its assistance in structuring responses (planning utterances, employing linking devices, organizing arguments), which corresponds to the functions of formative assessment and the use of speech quality descriptors.

The findings of this study are generally consistent with prior work indicating that digital and AI tools are most effective when they expand opportunities for practice and feedback rather than replace the learning process. Research on the communicative approach emphasizes that improvements in speaking skills result from systematic speech practice in meaningful interaction; in our case, this aspect was enhanced through AI-based dialogue and interaction activities [6–8]. At the same time, international studies on chatbots and AI in language learning stress their contribution to increasing language "contact time," providing personalization, and supporting autonomous practice – factors that are especially important for upper-secondary students with restricted class time [13–14]. The results obtained at School No. 117 are also in line with studies conducted In Kazakhstan, where AI is viewed as a means of strengthening communicative orientation, while its effectiveness depends on instructional design and the quality of teacher support [16; 18].

One of the key factors behind the effectiveness of the intervention was the teacher's role as organizer and moderator of AI-supported work. The AI tools did not produce positive outcomes by themselves; they became effective only when embedded in a system of purposeful pedagogical guidance. The teacher defined learning goals and success criteria (what could be considered a "good" response), designed communicative scenarios (such as role-plays, problem-solving tasks, and debates), allocated time and

selected formats of work (pair, group, individual), facilitated the transfer of skills from AI-mediated practice to live classroom communication, and guided reflective discussion (what had improved, which mistakes tended to repeat, which strategies proved helpful).

Quality control was equally important. It involved checking how appropriate the prompts were, limiting students' dependence on "ready-made texts," requiring them to demonstrate their own speaking (for instance, improvising from an outline, retelling, answering additional questions), and using transparent rubrics to assess fluency, accuracy, interaction, and coherence. In this format, AI operated as a tool for extending practice and feedback rather than as a source of a finished product.

Alongside the documented advantages, several risks and limitations must also be acknowledged. First, the quality of AI-generated output is uneven: answers may include linguistic inaccuracies, stylistically unsuitable phrases, or be misaligned with the learners' proficiency level. This makes critical scrutiny and the teacher's role as a filter essential. Second, issues of academic integrity come to the fore: if AI use is not monitored, students may substitute their own speech with generated texts, which weakens the diagnostic value of assessment and hampers the development of strategic independence.

Another risk concerns growing reliance on prompts and a possible decrease in students' willingness to formulate utterances on their own, unless the instructional design explicitly provides a gradual move from supported performance (with prompts) to more spontaneous production. Finally, there are limitations related to device and internet access, the digital divide, variation in learners' initial preparedness, and the relatively short time frame of the intervention. These factors require caution when attempting to generalize the results to other schools and educational contexts.

To conclude, the results indicate that AI has the strongest impact on those components of speaking that rely on the intensity and quality of verbal interaction (interaction and fluency), while also supporting improvements in accuracy and coherence when it is integrated with explicit pedagogical guidance, transparent assessment criteria, and systematic reflection. Taken together, this confirms the potential of AI as a means of reinforcing the communicative approach in school-based English instruction, provided that its use remains purposefully designed, pedagogically supervised, and appropriately regulated.

Conclusion. The study achieved its primary aim: to identify and assess how AI tools affect the development of communicative competence among high school learners of English at School No. 117 in Almaty. The results indicate that, when integrated in a systematic and regulated manner with adequate pedagogical support, AI can become an effective means of reinforcing the communicative focus of instruction and enhancing the quality of students' spoken language.

The comparative analysis demonstrated that, although the control and experimental groups started the intervention with a comparable level of communicative competence, by the end of the study the experimental group showed a markedly greater increase in the overall composite score. This allows the improvement to be linked to the purposeful integration of AI tools rather than to the natural, "planned" advancement of language skills over the course of the school year.

A closer examination of the individual speaking components revealed that interaction and fluency accounted for the greatest share of the experimental group's overall progress, complemented by improvements in linguistic accuracy and coherence. In this regard, AI tools proved particularly effective for those aspects that depend on frequent speaking practice and timely feedback: students engaged in dialogues more regularly, maintained communicative exchanges more actively, started speaking with fewer and shorter pauses, and progressively improved the quality of their speech.

One of the central findings of the study is that the effect of AI on learning outcomes is directly shaped by the pedagogical conditions of its use. The most effective configuration was the one in which AI was employed to broaden opportunities for speaking practice and to provide formative feedback, while the teacher retained responsibility for defining learning objectives, choosing and sequencing tasks, monitoring independent work, evaluating the suitability of AI-generated suggestions, and leading reflective discussion. It was this combination of technological tools with consistent pedagogical guidance that ensured the approach could be replicated and that the obtained results remained stable.

The practical significance of this study lies in the fact that the suggested combination of AI tools and task formats can be integrated into regular school English lessons to increase speaking time and promote interaction within the limits of a typical class period. It is recommended to use AI in short, systematic practice segments (such as dialogues, role-plays, speech-to-text work, clarification and paraphrasing exercises), ensuring that assessment criteria (fluency, accuracy, interaction, coherence) are clearly recorded and that final communicative tasks are carried out without any prompts.

The study has a number of limitations, including the fact that the sample was confined to a single school, the presence of constraints linked to access to devices and the internet, and the relatively short duration of the intervention. Future research should expand the scope by increasing the number of participants, involving multiple schools and different grade levels, and conducting longer-term follow-up to evaluate how stable the observed effects are over time. It is also important to investigate how different categories of AI tools affect particular components of communicative competence (for example, distinguishing between the influence of conversational chatbots and speech-analysis tools) and to develop consistent, school-wide guidelines that guarantee the safe and academically responsible use of AI in foreign language teaching.

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Information about the authors:

Muslimova Assem – PhD student, Department of foreign languages, Abai Kazakh National Pedagogical University, Republic of Kazakhstan, 050000, Almaty, e-mail: asemmuslimova797@gmail.com.*

Yelubayeva Perizat Keldibayevna – Candidate of Pedagogical Sciences, Associate Professor, Department of turkology and theory of languages, Al-Farabi Kazakh National University, Republic of Kazakhstan, 050000, Almaty, e-mail: perizat.yelubayeva@gmail.com.

Tulegenova Malika Baltabayevna – Master of Pedagogical Sciences, Senior Lecturer, Faculty of world languages, Department of practical English, Abai Kazakh National Pedagogical University, Republic of Kazakhstan, 050000 Almaty, e-mail: malika-askar@mail.ru.

Муслимова Асем – PhD докторанты, Шетел тілдері кафедрасы, Абай атындағы Қазақ ұлттық педагогикалық университеті, Қазақстан Республикасы, 050000 Алматы қ.; e-mail: asemmuslimova797@gmail.com.*

Елубаева Перизат Келдибаевна – педагогика ғылымдарының кандидаты, қауымдастырылған профессор, Түркология және тіл теориясы кафедрасы, Әл-Фараби атындағы Қазақ ұлттық университеті, Қазақстан Республикасы, 050000 Алматы қ.; e-mail: perizat.yelubayeva@gmail.com.

Тулегенова Малика Балтабаевна – педагогика ғылымдарының магистрі, аға оқытушы, Әлем тілдері факультеті, Практикалық ағылшын тілі кафедрасы, Абай атындағы Қазақ ұлттық педагогикалық университеті, Қазақстан Республикасы, 050000 Алматы қ.; e-mail: malika-askar@mail.ru.

Муслимова Асем – PhD докторант, кафедра иностранных языков, Казахский национальный педагогический университет имени Абая, Республика Казахстан, 050000 г. Алматы, e-mail: asemmuslimova797@gmail.com.*

Елубаева Перизат Келдибаевна – кандидат педагогических наук, ассоциированный профессор, кафедра тюркологии и теории языка, Казахский национальный университет имени аль-Фараби, Республика Казахстан, 050000 г. Алматы, e-mail: perizat.yelubayeva@gmail.com.

Тулегенова Малика Балтабаевна – магистр педагогических наук, старший преподаватель, факультет мировых языков, кафедра практического английского языка, Казахский национальный педагогический университет имени Абая, Республика Казахстан, 050000 г. Алматы, e-mail: malika-askar@mail.ru.

МРНТИ 20.01.45
УДК 37.026(075)
https://doi.org/10.52269/SRDG2612204

ПРОЕКТИРОВАНИЕ ИНТЕГРИРОВАННЫХ STEM-ПРОЕКТОВ КАК ИНСТРУМЕНТ РАЗВИТИЯ ИНЖЕНЕРНОГО МЫШЛЕНИЯ У БУДУЩИХ IT-ПЕДАГОГОВ

Мухамедиева К.М. – PhD, ассоциированный профессор высшей школы естествознания, Марғұлан Университет, г. Павлодар, Республика Казахстан.

Нургазинова Г.Ш. – магистр информатики, преподаватель-эксперт высшей школы естествознания, Марғұлан Университет, г. Павлодар, Республика Казахстан.*

Статья посвящена проблеме формирования инженерного мышления являющегося одним из актуальных и востребованных компетенций будущих IT-педагогов. Целью исследования является развитие навыков инженерного проектирования через проектирование интегрированных STEM-проектов будущими IT-педагогами. В статье показан фрагмент авторского проекта студентов, в котором студенты осваивают инженерное проектирование и разрабатывают методическое обеспечение для учителей школ и рабочие листы для обучающихся. В результате разработки гайда развиваются профессиональные навыки в обучении. В исследовании был проведен эксперимент с контрольной и экспериментальной группой студентов образовательной программы «Информатика». В течение учебного семестра было проведено наблюдение за контрольной и экспериментальной группами с целью выявления динамики данных успеваемости и выявления любых различий. Для определения уровня приобретенных навыков были привлечены эксперты и