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Developing prompt engineering skills in the pre-service training of foreign language educator

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Abstract

Importance. The integration of artificial intelligence technologies into the educational process is one of the key areas of digital transformation of education in Russia. In the context of the rapid development of AI technologies, there is an urgent need for pre-service educators to develop prompt engineering skills that allow them to formulate requests for generative AI to solve specific methodological problems. The formulation of high-quality prompt makes it possible to improve the quality of feedback from generative AI and optimize the processes of pedagogical planning, the development of educational and control materials, the adaptation of the learning content to the individual characteristics of students, etc. Ignoring this aspect of pre-service educators training now can lead to a professional backlog of graduates and their lack of competitiveness in the labor market in the future. In this regard, prompt engineering training should be considered an imperative of modern education. The purpose of this study is to identify the effectiveness of the prompt engineering skills development methodology for pre-service foreign language educators.

Research Methods. Theoretical methods were used such as the study of scientific and methodological literature on research issues, analysis, generalization and classification of information. In order to test the effectiveness of the proposed methodology, an experimental training was conducted aimed at developing the skills of prompt engineering among pre-service foreign language educators. 52 students of the 1st-4th courses of the Institute of Pedagogy, studying bachelor's degrees in the fields of "Pedagogical Education (English Language profile)" and "Linguistics (Theory and Methodology of Teaching Foreign Languages and Cultures" profile)" at Derzhavin Tambov State University, took part in the pilot training. The object of control was the nomenclature of prompt engineering skills of a foreign language educator, represented by ten skills reflecting the specifics of teaching a foreign language.

Definition of Concepts. The main concept in the study is prompt engineering or prompting. The paper describes in detail the basic and advanced prompting techniques aimed at obtaining high-quality feedback from generative AI.

Results and Discussion. The methodology for the developing prompt engineering skills in the pre-service training of foreign language educators has been tested during experimental training. Obvious progress is observed in the following controlled parameters: the skill to formulate prompt for organizing speech communication in a foreign language ($t = 9.8$ at $p < 0.001$), the skill to formulate prompt in order to find the necessary information, translate or explain complex educational material ($t = 6.2$ at $p < 0.001$), the skill to formulate prompt for developing a plan or lesson fragment ($t = 10.1$ at $p < 0.001$), the skill to formulate prompt for developing training exercises for de-

veloping lexical and grammatical skills (t = 7.3 at $p < 0.001$), the skill to formulate prompt for text generation (t = 5.5 at $p < 0.001$), the skill to formulate prompt for text adaptation (t = 5.8 at $p < 0.001$). The following parameters remained without significant progress: the skill to formulate prompt for creating technological lesson maps (t = 7.3 at $p > 0.05$), the skill to formulate prompt for developing control and measuring materials (t = 1.1 at $p > 0.05$), the skill to formulate prompt for conducting a comparative analysis of two or more texts (t = 0.9 at $p > 0.05$), the skill to formulate prompt for evaluating written creative work (t = 0.6 at $p > 0.05$).

Conclusion. Prompt engineering plays a significant role in the system of linguistic and methodological training of pre-service foreign language educators based on AI technologies, as it allows them to master modern techniques of interaction with generative AI. For junior students, it is advisable to focus on the basic skills of interacting with generative AI, and for senior students – on solving specific methodological tasks. Prompt engineering training should be continuous and start from the first year, integrating into the learning process through individual disciplines, for example, through "Introduction to Artificial Intelligence" or minors, so that senior students can apply their knowledge to solve more complex cognitive tasks. The technique of autoprompting allows students to visually study the anatomy of high-quality prompt and at the same time develop critical thinking by analyzing and refining AI-generated prompt. The perspective of the study is to observe the effectiveness of the autoprompting technique in the pre-service training of foreign language educators. The results obtained can be used in further research on the study of prompt engineering techniques for educators or students of pedagogical training areas, for the development of author's methods of teaching prompt engineering to educators, as well as in the methodology of teaching a foreign language.

Keywords: prompt engineering, prompting, AI technologies, AI competence, linguistic and methodological pre-service training of a foreign language educator

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Развитие умений промпт-инжиниринга у будущего педагога иностранного языка

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Аннотация

Актуальность. Интеграция технологий искусственного интеллекта в образовательный процесс выступает одним из ключевых направлений цифровой трансформации образования в России. В условиях стремительного развития ИИ-технологий возникает острая необходимость формирования у будущих педагогов навыков промпт-инжиниринга, позволяющих формулировать запросы к генеративному ИИ для решения конкретных методических задач. Формулирование качественного промпта позволяет повысить качество обратной связи от генеративного ИИ и оптимизировать процессы педагогического планирования, разработки учебных и контрольно-измерительных материалов, адаптации содержания обучения под индивидуальные особенности обучающихся и др. Игнорирование данного аспекта подготовки педагогических кадров сейчас может привести к профессиональному отставанию выпускников и их неконкурентоспособности на рынке труда в будущем. В этой связи обучение промпт-инжинирингу следует считать императивом современного образования. Цель исследования – выявить эффективность методики развития умений промпт-инжиниринга у будущего педагога иностранного языка.

Методы исследования. Использовались теоретические методы, такие как изучение научной и научно-методической литературы по проблематике исследования, анализ, обобщение и классификация информации. С целью проверки эффективности предлагаемой методики было проведено опытное обучение, направленное на развитие умений промпт-инжиниринга у будущих педагогов иностранного языка. В опытном обучении приняли участие 52 студента 1–4 курсов Института педагогики, обучающиеся бакалавриата по направлениям подготовки «Педагогическое образование (профиль «Английский язык)» и «Лингвистика (профиль «Теория и методика преподавания иностранных языков и культур»)» ФГБОУ ВО «Тамбовский государственный университет им. Г.Р. Державина», г. Тамбов. Объектом контроля выступила номенклатура умений промпт-инжиниринга педагога иностранного языка, представленная десятью умениями, отражающими специфику преподавания иностранного языка.

Определение понятий. Основным понятием выступает промпт-инжиниринг или промптинг. Подробно рассмотрены базовые и продвинутые техники промптинга, направленные на получение качественной обратной связи от генеративного ИИ.

Результаты исследования. Разработанная методика развития промпт-инжиниринга у будущего педагога иностранного языка была апробирована в ходе опытного обучения. Очевидный прогресс наблюдается по следующим контролируемым параметрам: умение формулировать промпт для организации речевого общения на иностранном языке (t = 9,8 при p < 0,001), умение формулировать промпт с целью поиска необходимой информации, перевода или объяснения сложного учебного материала (t = 6,2 при p < 0,001), умение формулировать промпт для разработки плана или фрагмента урока (t = 10,1 при p < 0,001), умение формулировать промпт для разработки тренировочных упражнений на отработку лексико-грамматических навыков (t = 7,3 при p < 0,001), умение формулировать промпт для генера-

ции текста (t = 5,5 при p < 0,001), умение формулировать промпт для адаптации текста (t = 5,8 при p < 0,001). Параметрами без значимого прогресса остались: умение формулировать промпт для создания технологических карт урока (t = 7,3 при p > 0,05), умение формулировать промпт для разработки контрольно-измерительных материалов (t = 1,1 при p > 0,05), умение формулировать промпт для проведения сравнительного анализа двух и более текстов (t = 0,9 при p > 0,05), умение формулировать промпт для оценки письменной творческой работы (t = 0,6 при p > 0,05).

Выводы. Промпт-инжиниринг в системе лингвометодической подготовки будущего педагога иностранного языка на основе ИИ-технологий играет значительную роль, поскольку позволяет овладевать современными техниками взаимодействия с генеративным ИИ. Для младших курсов целесообразно делать акцент на базовых навыках взаимодействия с генеративным ИИ, а для старших – на решении конкретных методических задач. Обучение промпт-инжинирингу должно быть непрерывным и начинаться с первого курса, встраиваясь в учебный процесс через отдельные дисциплины, например, через «Введение в искусственный интеллект», или майноры, чтобы на старших курсах обучающиеся смогли применять полученные знания для решения более сложных по когнитивному уровню задач. Техника автопромптинга позволяет обучающимся наглядно изучать анатомию качественного промпта и одновременно развивать критическое мышление путем анализа и доработки сгенерированных с помощью ИИ промптов. Перспективу исследования составляет изучение эффективности техники автопромптинга в подготовке будущих учителей иностранного языка посредством ИИ-технологий. Полученные результаты могут быть использованы в дальнейших исследованиях по изучению техник промпт-инжиниринга для педагогов или обучающихся педагогических направлений подготовки, для разработки авторских методик обучения педагогов промпт-инжинирингу, а также в методике обучения иностранному языку.

Ключевые слова: промпт-инжиниринг, промптинг, ИИ-технологии, ИИ-компетенция, лингвометодическая подготовка будущего педагога иностранного языка

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IMPORTANCE

The integration of artificial intelligence (AI) technologies into the system of pre-service training of foreign language educator at the current stage of informatization of the higher education system in the Russian Federation contributes to the implementation of strategic goals set by regulatory documents at the state level. According to the national priority project “Data Economics and Digital Transformation”, the key directions are the accelerated development of AI technologies in Russia, increasing the recognition of domestic AI-based technological solutions and increasing the level of digital literacy of the population. One of the directions should be the training of professional personnel capable of formulating correct requests (prompts) and, thereby, to develop AI to customize AI-based

technological solutions to solve specific industry tasks. To address this issue, each educational program should include special modules on learning the fundamentals of working with AI, tailored to the specific training area and industry. By completing such an extended curriculum, graduates will develop skills in interacting with generative AI and be able to utilize the generated materials within their future profession.

Speaking about the training of teaching staff in the context of the digital transformation of education, it is increasingly being argued that modern teachers face certain challenges on a daily basis. These challenges include the need to develop digital competencies, master new teaching technologies, and adapt traditional teaching methods to take advantage of the didactic properties and methodological functions of new technologies. In this regard, it is essential to pay more attention to the content of professional training and retraining programs for teaching staff, with a focus on developing digital literacy and skills in working with large volumes of data. It is also important to equip teachers with the ability to effectively use online platforms and create digital educational resources [1]. Furthermore, the professional development of teachers must not be an episodic process, but rather a continuous one that allows them to navigate the ever-changing world of technology. This continuous development ensures that teachers remain up-to-date and able to provide the best possible education for their students in the digital age.

The educator of the new formation acts not only as a knowledge provider, but also as an architect of the educational environment, that can to flexibly adapt to the individual needs of students. By transferring part of the pedagogical functions to artificial intelligence, we observe how AI is transformed from a tool of learning into a subject of the educational process. For example, at the current stage of development, AI is able to act as a virtual interlocutor and training partner, taking a direct part in the students' language skills development, evaluating students' written work, carrying out pedagogical design, developing educational, methodological and assessment materials, etc. However, the effectiveness and quality of the feedback received from generative AI depends on the ability of the teacher or student to correctly formulate prompts in order to solve a specific problem. The experience of interaction with generative AI indicates that low-quality prompt, as a rule, leads to the generation of superficial, inaccurate, or ethically unsafe information materials, which in turn contributes to discrediting the very idea of using AI technologies in the educational process. Thus, it can be said that prompt engineering is being transformed from a narrow technical skill into a fundamental pedagogical competence, including the development of communicative skills for interacting with AI along with the development of critical thinking aimed at assessing the quality of generated information and the expediency of its further use.

Federal state educational standards of higher education within the framework of the teacher training system define a set of universal and professional competencies related to the use of digital resources, the design of the educational process and the development of an individual educational trajectory. The developed skills to consciously interact with AI through high-quality prompts directly contribute to the achievement of these goals. The student, a future educator who knows the basics of prompt engineering, will be able to independently develop personalized communication tasks and training exercises using AI, generate ideas for discussion, optimize the routine workload associated with the preparation of documentation and assessment of written works, as well as receive analytical support. It is also up to AI to make informed pedagogical decisions independently in the future.

Ignoring the need to develop prompt engineering skills at the present stage in the future creates risks of professional stagnation. A graduate of a pedagogical university who does not know the basics of interaction with generative AI will not be competitive in the job market and will not be able to fully meet the demands of the digital economy, which is already being formed today. Therefore, the development of prompt engineering skills among students of pedagogical programs is not an optional task, but a necessary condition for them to fulfill their main pedagogical mission – to educate a successful adaptive generation that is oriented in a high-tech world.

Currently, there is already an extensive body of scientific research devoted to the integration of AI technologies into the system of pre-service teacher training and the development of author's methods of teaching a foreign language using various technological solutions based on AI technologies. For example, in their work P.V. Sysoyev, M.N. Evstigneev and D.O. Sorokin [2] develop a structural model of pre-service teacher training based on AI; P.V. Sysoyev and M.N. Evstigneev [3], S.V. Titova and I.V. Kharlamenko [4] reveal the features of language and methodological pre-service teachers' training using AI technologies; M.N. Evstigneev [5] offers a methodological model for pre-service teachers' training through AI-based technological solutions; V.V. Klochikhin, O.G. Polyakov [6] use AI tools to conduct corpus analysis; P.V. Sysoyev and M.I. Ivchenko [7] analyze the possibility of developing phonetic skills of students using AI; P.I. Lobeeva [8] – the possibility of developing vocabulary using AI chatbots; N.V. Chetyrina [9] – development of written interaction and communication skills when working with AI; A.P. Avramenko and E.R. Bulanova [10] – development of students' independence in the context of AI integration into educational activities; S.V. Bogolepova and M.G. Zharkova [11] – essay evaluation and feedback from generative AI. The issues of developing a special type of competence for a teacher in the field of using AI technologies also became the object of research [12–14].

The analysis of these works indicates that, in order to achieve their objectives, researchers to some extent raised the issues of creating prompts to solve a specific pedagogical or methodological problem. However, until now, the problem of prompt engineering skills in the pre-service training of foreign language educator has not been the subject of a separate research.

RESEARCH METHODS

To conduct the research, theoretical methods were used such as the study of scientific and methodological literature on research issues, analysis, generalization and classification of information. In order to test the effectiveness of the proposed methodology, an experimental training was conducted aimed at developing the skills of prompt engineering among pre-service foreign language educators. 52 students of the 1st–4th courses of the Institute of Pedagogy, studying bachelor's degrees in the fields of "Pedagogical Education (English Language profile)" and "Linguistics (Theory and Methodology of Teaching Foreign Languages and Cultures" profile)" at Derzhavin Tambov State University, took part in the pilot training. The object of control was the nomenclature of prompt engineering skills of a foreign language educator, represented by ten skills reflecting the specifics of teaching a foreign language.

DEFINITION OF CONCEPTS

From a technical standpoint, the concept "prompt engineering", or in a simplified form "prompting", is the area of developing and optimizing text queries (prompts) to large language models in order to obtain the most relevant answers. In practice, prompt engineering

assumes that a person has a combination of knowledge, skills and abilities to *accurately formulate tasks for artificial intelligence, taking into account the context, role, format and limitations*, which transforms generative AI from a simple source of information into a powerful tool for solving specific tasks of a professional nature.

Generally accepted models of prompt engeering are common in the field of information technology. One of the most effective is the CRISP model, which makes it possible to create high-quality prompts for AI. An example of building a prompt for a foreign language teacher using this model: *"C (Context): English lesson for students with A2 level. Topic: "In the restaurant." R (Role): You are an expert in the field of English language teaching methods. I (Intent): Write a dialogue between a waiter and a customer in a restaurant. S (Scenario): The customer makes an order, asks for recommendations, asks for a check. The dialogue should be realistic and contain an active vocabulary so that students can use vocabulary in further communication. P (Parameters): Length: 8–10 lines for each participant. Add an active vocabulary: "starter", "main course", "sparkling water", "salmon". Specify the translation for the active vocabulary."* Obviously, the anatomy of a qualitative prompt should include such components as defining the role function of AI, the context, action scenario, and the format of the expected result. However, modern AI-based technological solutions can independently define the context, narrow or expand it depending on the task and the set requirements.

Taking into account the specifics of foreign language teaching, we will analyze the features of the prompt engeeniring depending on a specific functional task. P.V. Sysoyev, E.M. Filatov and D.O. Sorokin [15] in their study describe six types of feedback that students can receive from generative AI. Educational and social feedback reflects the AI's ability to act as a virtual interlocutor, allowing students to participate in discussions in the target language. An example of an educational and social prompt: *"Hello! Let's talk about climate changing".* Information and reference feedback is provided as a response to a request for information and a detailed explanation. An example of an information and reference prompt: *"Explain, in what cases should I use Present Perfect. Provide examples".* Methodological feedback makes it possible to turn AI into an active teacher's assistant, who is able to carry out subject-thematic planning, develop lesson plans, and create educational, methodological, and assesment materials. An example of a methodological prompt: *"Develop a technological map of a foreign language lesson for ninth grade students. The theme is "My future profession". Language level A2-B1. Identify universal learning activities."* Conditionally creative feedback from AI is aimed at generating so-called creative content. An example of a conditionally creative prompt: *"Write an essay on topic "Scary story".* Analytical feedback allows us to process large amounts of information, identify relationships and build hypotheses. An example of an analytical prompt: *"Here are three texts on the same topic. Analyze the content, identify the relationship between the aspects discussed in the texts. Formulate conclusions."* Evaluative feedback allows us to obtain from AI an assessment of written test and creative work according to predefined criteria and the instructions of the assessment scale. An example of an evaluative prompt: *"Evaluate the student's essay according to the following criteria on a five-point scale: a) disclosure of the main idea; b) language correctness; c) structure; d) coherence; e) originality. Write a short comment on each criterion, highlighting the positive aspects, as well as what needs to be improved. Put an overall grade at the end."* The examples above show how, by controlling artificial intelligence through prompts, we can get one or another type of feedback.

Let's take a closer look at the basic and advanced prompting techniques that are widespread in practice. The main types of basic prompting include the following techniques: zero-shot prompting, one-shot prompting and few-shot prompting [18; 19].

Zero-shot prompting is a technique of making a request to an AI without providing specific examples or specifying the context. With zero-shot prompting, the AI independently performs the task based on the ability to generalize existing knowledge and use only the description of the instructions in the prompt. Due to the fact that the model does not receive specific instructions from the user, the generated response can be compiled in any format and contain both relevant and irrelevant information. An example of a zero-shot prompting: *"Create a dialogue in English for students with A2 level."*

One-shot prompting involves a technique for interacting with generative AI, in which a text query includes one specific example of performing a similar task in order for the AI to understand the format, style, or level of complexity of the expected response. The AI analyzes the provided example, identifies the so-called pattern (including the structure, type of response, and depth of study) and applies it to solve a new problem. Thus, the AI obtains an accurate sample of the expected response, which significantly reduces the risk of receiving an unpredictable response. The formulation of a prompt with one example usually includes clear instructions; an example that should be correct (not contain errors), relevant (affect different aspects or variants of the task), meaningful (demonstrate a single logic of execution according to a template); separation of the components of the prompt through the designation "Task", "Correction" and the "Rule". An example of one-shot prompt: "*I will give you sentences with mistakes. Your task is to correct the mistake and clarify the rule. For example: Assignment: A sentence with the mistake "She don't like apples". Correction: "She doesn't like apples". Rule: "In Present Simple, for pronouns he/she/it (3rd person units), the auxiliary verb "to do" takes the form "does". Now correct the mistake in the following sentence: "They is studying for the exam."*

The essence of a *few-shot prompting* is that the user sets a text query to the AI simultaneously with several task execution examples (2 or more). In this case, the model analyzes all the provided examples, identifies hidden rules, structure, and context, and then applies the extracted parameters to the new task. The formulation of the few-shot prompting follows similar scheme, as one-shot prompting. An example of the few-shot prompting: *"Transform the words in brackets so that they grammatically match the sentence. Follow the following pattern. Sentence 1: "It was a ___ (to decide) that changed my life." Answer: "decision". Sentence 2: "She is a very ___ (create) person." The answer is "creative". Sentence 3: "This news will ___ (sharp) our focus on the problem." The answer is "sharpen". Now generate ten sample sentences for developing word-formation models with the suffixes "-ment", "-tion", "-ify", "-ive", "-en".* Naming several examples for AI allows you to show nuances that are difficult to convey in one instruction or one example. In contrast to zero-shot prompting, using one-shot or few-shot prompts allows you to more accurately explain a complex or specific task to AI and receive feedback from it on typical training exercises, tests and communication tasks combined by following a single format. However, if there are no clear instructions or examples in the prompt, the AI is most prone to hallucinations and may start making up information.

Advanced types of prompting include the following techniques: chain-of-thought prompting, self-consistency prompting, and tree of thought prompting [20].

Chain-of-thought prompting is a technique for interacting with AI, in which involves prompting to sequentially identify log-

ical steps to solve a problem using a text query, rather than immediately produce the final result. To solve the problem, AI breaks down a complex query into precise stages, imitating human judgment, that is, the model explains how it came to a particular conclusion. It is believed that this approach reduces the risk of hallucinations and the formulation of hasty incorrect conclusions, since AI is forced to justify each of its actions. At the same time, the user has the opportunity to monitor the reasoning process and, through subsequent prompts, correct and direct it in the right direction. The anatomy of prompts in the chain of thought includes a clear statement of the problem and a direct indication of the process through the use of the following phrases: "Let's think together", "Explain step by step", "Show all the steps of the solution", etc. An example of the chain-of-thought prompting: *"Explain why the Past Perfect tense is used in this sentence rather than Past Simple. Show me the reasoning. Sentence: "When I arrived at the party, John had already left".* The expected response from generative AI will be as follows. *"Step 1. The sentence describes two events in the past, my arrival at the party (arrived) and John's departure (left). Step 2. The "left" action occurred earlier than the "arrived" action. Step 3. In English, the Past Perfect tense is used for an action that took place before the start of another action in the past. Step 4. Therefore, the earlier action is expressed through "had left" (Past Effect), and later – through "arrived" (Past Simple). Conclusion: the use of Past Perfect in this sentence is grammatically correct".* Obviously, the use of chain-of-thought prompting allows AI to transform from a random response generator into a virtual assistant that is able to explain complex linguistic phenomena in a coherent and logical way. In modern chatbots, the chain-of-thought function is implemented in separate modes, such as DeepSeek's "DeepThink", Mistral AI's "Think", ChatGPT's "Thinking", and YandexGPT's thinking mode.

Self-consistency prompting involves the use of an improved technique for interacting with AI based on a chain of thought, but instead of one attempt, AI generates several chains and makes an independent decision by brainstorming - it chooses the most effective response among them. Thus, to solve a single problem, the AI runs the same prompt several times. Due to stochasticity, AI can generate different chains of thought each time, while the final result is determined by choosing the most common solution to the problem among many others. Self-consistency prompting can be started by manually repeating the same prompt several times, or by including in the prompt body the amount that the AI must process this prompt. An example of a self-consistency prompting: "*Translate into English the Russian proverb «В гостях хорошо, а дома лучше». Use step-by-step reasoning to justify your translation. Run the prompt five times and choose the best answer".* In the feedback, the AI provides five logical chains with different response options, including a literal translation, and selects the most frequent idiomatic variant: "There's no place like home".

Tree of thoughts prompting is an advanced technique for formulating textual requests, encouraging AI to explore several options for solving a problem, evaluate them, and make a strategically sound decision about which direction to move forward. Unlike the previous two prompting techniques, the use of a "tree of thought" allows AI to model different situations, change its decision during the analysis process, and choose the most reasonable solution option. With the help of this type of prompting, it becomes possible not just to generate text, but to observe how AI develops logic and makes decisions, acting as a kind of expert in a particular field, which becomes especially relevant when testing various kinds of hypotheses. The "tree of thoughts" prompt-

ing can be used in pedagogical planning and the development of lesson plans or fragments, for example: "*Develop a detailed lesson plan (45 minutes) for the B1 level on the topic "Climate and Ecology". Consider different learning styles: auditory, visual, and kinesthetic. Show the process of building a "tree of thought": generate three different versions of the lesson structure, evaluate their effectiveness and choose the best option for the chosen topic".* This type of prompting also allows you to perform creative tasks that require complex analysis, for example: *"Write an essay on the topic "The impact of globalization on national languages". Generate four different theses, evaluate them on the scale of originality, and then develop the most promising one, while checking for any counterarguments".*

In addition to basic and advanced prompting techniques, we should also highlight the technique of *prompt chaining*, which is used when it is necessary to create a controlled chain of reasoning or actions that determine the achievement of a learning goal. The essence of this technique lies in the fact that a complex task is broken down into a sequence of simpler, interconnected steps (prompts). Accordingly, the answer received from the AI at one step becomes part of the input data for the formulation of the next prompt. As a result, instead of one overloaded prompt, we get a series of short, narrowly focused queries. At the same time, the user has the opportunity to check and adjust the results at each stage, preventing the growth of hallucinations. The technique of prompt separation displays effectiveness in the development of educational and methodological materials, for example: *"Step 1. Select fifteen words on the topic "Remote work". Foreign language proficiency level B1. Create a table and place the list in two columns: the word and the translation into Russian".* The AI generates a table with two columns and fills them with words and a translation. *Step 2: Using the list of words from Step 1, create a "fill-in-the-blanks" exercise. Write fifteen sentences in English, each with one word from the table missing. Make the missing words difficult enough to require the reader to understand the context".* The AI executes the query and generates fifteen sentences with blanks. "*Step 3. Here is the exercise: [insert the result from Step 2]. Create keys for the teacher. For each sentence, specify the correct answer and give a brief explanation of the choice".* The AI generates keys for the teacher according to the parameters specified in the query.

The technique of chaining prompt also allows you to adapt texts to the required level of proficiency in a foreign language (example of prompt: *"Adapt this text: [insert text] for level B1. Simplify grammatical constructions and replace complex vocabulary with common vocabulary");* create questions to understand (example of prompt: *"Based on the adapted text [insert simplified text], create seven questions to test the understanding of the main content. Three questions with a choice of answer. Each task should have four possible answers, only one of which is correct. Questions should be presented in the form of sentences with blanks. Two general questions (with a short "Yes/No" answer). Two specific questions starting with the questions words "how long", "where", "why");* create discussion tasks (example of a prompt: *"Based on the identified questions [adding questions], propose five aspects for discussion in a group that will allow you to reveal the ideas outlined in the text");* formulate topics for an essay (example of prompt: *"Write three relevant topics for an essay in accordance with the issues discussed in the discussion [adding aspects for discussion]. Topics should be formulated in the form of questions that suggest a reasoned response").*

Thanks to the chaining prompt technique, AI becomes an effective teacher's assistant on a daily basis, as the process of interacting with AI becomes manageable. This type of prompt-

ing ensures contextual continuity, provides the teacher with full control over the results obtained, and saves time by allowing him to solve more complex cognitive professional tasks.

If the basic types of prompting establish a direct request for AI, then advanced types of prompting are aimed at creating *metaprompts* – "creating instructions for creating instructions" and developing AI thinking strategies, controlling not the content, but the process of its thinking. By setting the AI a detailed algorithm for performing actions through prompt, we, in fact, train it by creating rules of interaction and designating patterns of responses that we want to get as a result.

A special case of metaprompting should be considered *auto-prompting*, or a user's request to the AI with a query to create a prompt. In this case, such prompt will be considered weak (prompt: *"Help me create an English lesson plan"*), because it lacks specification of the purpose of teaching, the topic of the lesson, the level of proficiency of a foreign language, the duration of the lesson, etc.), and the prompt is open to interpretations by AI. Among the possible actions to enhance the prompt, you can include the following phrase: *"Ask me questions to enhance my prompt"* and, answering them gradually, provide the AI with the necessary information or ask the AI to formulate the prompt itself and further edit it, adapting it to a specific task.

An analysis of the research base on the issue under consideration allows us to conclude that D. Lee and E. Palmer [19], J. Park and S. Choo [20], D. Federiakin, D. Molerov, O. Zlatkin-Troitschanskaia, A. Maur [21], N.D. Deshmukh and V.A. Shrouty [22] consider prompt engineering in their work as a skill of the 21st century, which must be developed in the higher education system. The scientific literature is currently actively discussing the issues of creating prompts for training and interaction in a specific professional field, for example, T.F. Heston and C. Khun [23], S. Jeon, H.G. Kim and [24] are developing prompts for teaching medical students; S.A. Chubov [25] – future pharmacists; G. Zambrano [26], P.V. Sysoyev, V.V. Kharin, M.V. Gavrilov [27], A.E. Kirpichev [28], N.M. Kropachev, P.P. Serkov, S.Yu. Sevryukov, V.V. Arkhipov [29] – law students; P.I. Lobeeva [8] – students of a technical university studying engineering; J.L. Araújo and I. Saúde [30], S. Tassoti [31] – students of chemistry; Y. Lu, X. Hu and D. Zhang [32] – psychology students; I.S. Lukinskii and I.A. Gorsheneva [33] – educators; O.N. Ivanishcheva [34] – future teachers of the Russian language; U. Lee, H. Jung, Y. Jeon, Y. Sohn, W. Hwang, J. Moon, H. Kim [17], I. Isemonger [35], E.M. Zakhtser [36], Z. Lin [37], N.V. Chetyrina [9] – linguists and specialists in the field of methods of foreign language teaching. Prompt engineering in the research of P.V. Sysoyev [13] and S. Emily [38] is included in the structure of the AI competence of a modern educator.

Almost all authors note that even the most modern AI-based solutions, operating on large language models, can provide superficial, although at first glance plausible, answers that may be incorrect, incomplete, and ethically unsafe in response to low-quality prompt. This is explained by the fact that AI often does not have a genuine understanding of concepts, facts, or phenomena, which limits its use to solve certain types of professional tasks without strict supervision from an expert in this field (lawyer, physician, educator, etc.). Therefore, the quality of AI feedback directly correlates with the quality of the prompt, its type and functional orientation.

Taking into account all the above, prompt engineering for a foreign language educator represents *a modern metacognitive competence, which is the conscious formulation of textual queries aimed both at obtaining high-quality feedback from generative artificial*

intelligence and at activating one's own critical thinking.

RESULTS AND DISCUSSIONS

In order to test the effectiveness of the proposed methodology, an experimental training was conducted aimed at developing the skills of prompt engineering among pre-service foreign language educators. Within the framework of the short-term course "Prompt Engineering for Future Foreign Language Teachers" with a duration of 18 academic hours, students completed 4 modules, including the basics of interaction with generative AI in the methodological and research activities of an educator, prompt engineering techniques, practical tasks for creating prompts, analysis of the most widespread errors. 52 students of the 1st-4th courses of the Institute of Pedagogy, studying bachelor's degrees in the fields of "Pedagogical Education (English Language profile)" and "Linguistics (Theory and Methodology of Teaching Foreign Languages and Cultures" profile)" at Derzhavin Tambov State University, took part in the pilot training.

Before starting the training (at the initial stage), a questionnaire was conducted to identify the frequency of using AI-based technological solutions to solve educational tasks. 91 % of respondents use generative AI in educational or research activities on an almost daily basis; 7 % turn to AI no more than 1–2 times a week; 2 % of respondents noted that they do not use AI for educational purposes. The majority of respondents noted that they use generative AI to search for educational information (42 %) and generate texts (39 %), translate (10 %), develop additional educational materials (5 %), and draw up plans and schedules (4 %). At the same time, a relatively large percentage of respondents answered that they use AI to communicate on arbitrary topics for entertainment purposes (78 %), and only 22 % of them used chatbots for educational communication in a foreign language. Chatbots are rarely used for methodological purposes (7 %) due to the use of lesson design neural networks such as Twee or MagicSchool (93 %), where no prompt is required. 27 % of students are familiar with the essence of the concept of prompt engineering, 46 % have heard of it but do not know it, 7 % have never heard of it.

The prompts were assessed by the English teacher on a five-point scale. During initial stage, students were asked to formulate prompts for generative AI (ChatGPT, DeepSeek, Mistral AI, and YandexGPT) in accordance with the tasks set, which formed the basis for the nomenclature of skills for prompt engineering of a foreign language educator.

The nomenclature of prompt engineering skills of a foreign language educator is presented in our study in the following way:

1) the skill to formulate prompts for organizing speech communication in a foreign language (direct participation in communication with AI, generation of dialogues, role-playing games, communicative situations corresponding to the level of proficiency in a foreign language and the interests of the student);

2) the skill to formulate prompt in order to find the necessary information, translate or explain complex educational material (search for synonyms/antonyms, perform abstract translation, explain grammatical rules, linguistic concepts, etc.);

3) the skill to formulate prompt for the development of a plan or lesson fragment with an indication of the goal, content of learning, methods and organizational forms, ways of managing the learning process, time constraints, types of speech activity, etc.;

4) the skill to formulate prompt for the creation of technological lesson maps with the designation of universal learning activities, meta-subject relationships, and differentiation by type of training sessions;

5) the skill to formulate prompt for the development training exercises for developing lexical and grammatical skills;

6) the skill to formulate prompt for the development of control and measuring materials (tests, control papers with evaluation criteria and validity parameters);

7) the skill to formulate prompt for the generation of a text of a certain type, style, level of complexity and subject matter;

8) the skill to formulate prompt for text adaptation (simplification or complication);

9) the skill to formulate prompt for conducting a comparative analysis of two or more texts, identifying common and distinctive patterns, generalizing and classifying information;

10) the skill to formulate prompt for evaluating written creative work.

At the formative stage, short-term training was conducted, during which students were introduced to the basics of interaction with generative AI, including issues of ethics [39] and information security, and techniques for formulating prompts for various tasks. In order to consolidate the studied material, the practice of formulating prompts for generative AI was carried out and the errors that were most often encountered in the process of interacting with AI were analyzed.

At the final stage, students were asked to re-formulate prompts in accordance with the nomenclature of prompt engineering skills of a foreign language educator. The results of the experimental training are presented in Table 1.

The data in Table 1 indicate that progress is being observed in the development of those skills where the educational and methodological task is based on a simple algorithm and does not require students to have highly specialized subject knowledge in the field of foreign language teaching methods, general pedagogy and psychology, testology, etc.

Table 1

Comparison of the results before and after conducting experimental training on the industrial engineering skills development for future foreign language teachers

Controlled parameter	Group	Average score (before training)	Average score (after training)	*t*-score	*p*-value
1. Prompt: organizing speech communication	*N* = 52	2.1	4.3	9.8	<0.001*
2. Prompt: information search / translation / clarification of complex material	*N* = 52	3.5	4.6	6.2	<0.001*
3. Prompt: plan / lesson fragment development	*N* = 52	1.8	4.1	10.1	<0.001*
4. Prompt: creating technological lesson maps	*N* = 52	1.2	1.9	1.5	0.14**
5. Prompt: training exercises development (vocabulary/grammar)	*N* = 52	2.9	4.4	7.3	<0.001*
6. Prompt: control and measuring materials development	*N* = 52	2.5	2.8	1.1	0.28**
7. Prompt: text generation	*N* = 52	3.8	4.7	5.5	<0.001*
8. Prompt: text adaptation	*N* = 52	3.0	4.2	5.8	<0.001*
9. Prompt: two or more texts analysis	*N* = 52	2.2	2.5	0.9	0.37**
10. Prompt: evaluating written creative work	*N* = 52	1.5	1.7	0.6	0.55**

Note. * – $p \leq 0.05$; ** – $p \geq 0.05$.

Source: calculated and compiled by the authors on the results of experiment teaching.

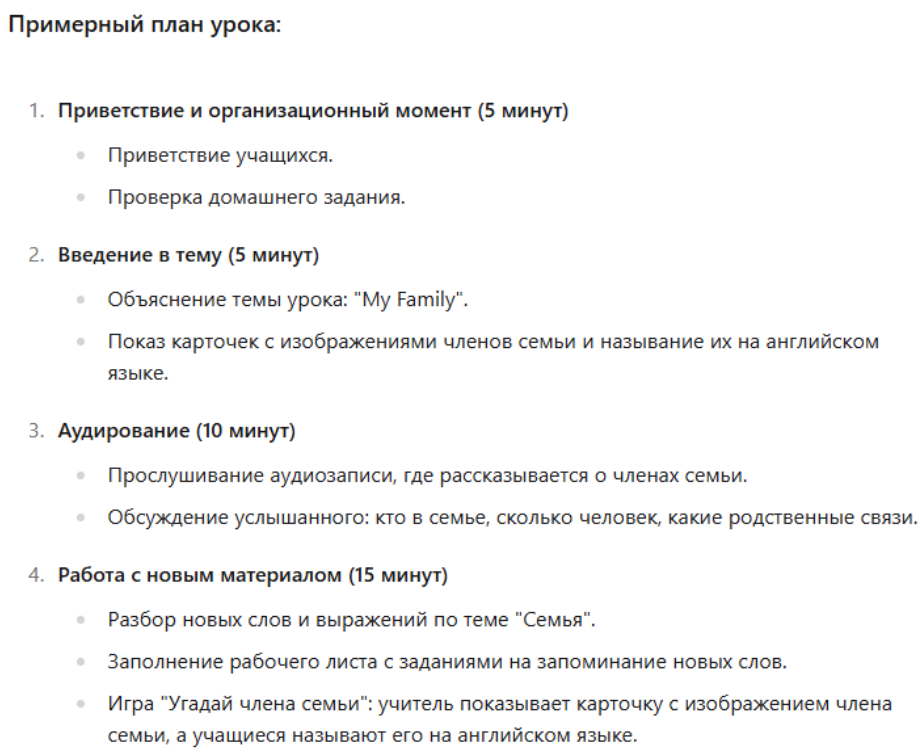

Fig. 1. An example of a methodically incorrect result from the neural network Mistral AI
Source: the screenshot is made by the authors in the neural network Mistral AI.

According to parameters No. 1, 2, and 7, significant growth was noted: the skill to formulate prompt for organizing speech communication (t = 9.8 at $p < 0.001$), the skill to formulate prompt for information retrieval/ translation/ explanation of complex material (t = 6.2 at $p < 0.001$), the skill to formulate prompt to generate text (t = 5.5 at $p < 0.001$), despite the fact that the initial data was relatively high, since the students already had experience interacting with a generative AI before starting the training. In practice, simple prompts such as *"Let's talk about the topic of "At the airport"* before the training, changed to more complex ones after– "*Dialogue in English. You're an immigration officer, I'm a passenger. My level of foreign language proficiency is B1. Ask me questions, and I will answer. The number of questions is 10. Use an active vocabulary: "check-in", "departure", "duty-free", "customs", etc."*According to parameters 3, 5, and 8, growth is also observed – the skill to formulate prompt for developing a lesson plan/lesson fragment (t = 10.1 at $p < 0.001$), the skill to formulate prompt for developing training exercises (t = 7.3 at $p < 0.001$), and the skill to formulate prompt for text adaptation (t = 5.8 at $p < 0.001$). However, it should be noted that during the training and in practical classes, the development of these skills was given the most time, as students made mistakes in the formulation of the prompt and gained negative experience of interacting with generative AI. An example of a negative experience is a simple prompt *"Create an English lesson plan for the topic "My family" for the second grade".* Fig. 1 shows an example of a methodically incorrect result from the neural network Mistral AI, generated as a response to a simple prompt.

During the analysis, it was revealed that this prompt is weak and contributes to the generation of superficial, methodically incorrect data, since AI suggests introducing new vocabulary at the stage after completing the main communicative task. A subsequent prompt indicating the lesson format and the introduction of a three-phase learning model corrects this error. In the future, in order to avoid such mistakes, students were introduced to the components of pedagogical planning [40] and began to include them in the body of the prompt.

The following parameters remained without significant progress: the skill to formulate prompt for the development of a technological lesson map (t = 7.3 at p > 0.05), the skill to formulate prompt for the development of control and measuring materials (t = 1.1 at p > 0.05), the skill to formulate prompt for the analysis of two or more texts (t = 0.9 at p > 0.05), the skill to formulate prompt for evaluating creative written work (t = 0.6 at p > 0.05). The lack of progress is explained, firstly, by the limited number of academic hours in the course of study, secondly, by the lack of fundamental subject and methodological knowledge among students, which they receive only in senior courses, and thirdly, by the high complexity of cognitive tasks. Using the example of developing a technological lesson map or control and measuring materials junior students faced the problem that they could not create a high-quality prompt due to the fact that they did not understand what the final product should look like. Conducting analytical and evaluation activities also caused difficulties due to poorly developed critical thinking against the background of a lack of ability to set analytical tasks for themselves, since in the first case, most students could not independently determine the criteria for comparing two texts, and in the second case, the criteria for personalized assessment for the essay.

CONCLUSION

The conducted experimental training allowed us to formulate the following conclusions.

Firstly, the short-term course “Prompt engineering for Future Foreign Language Educators” allowed us to develop practice-oriented prompting skills aimed at searching, generating and adapting educational materials, etc., as evidenced by the high values of the Student’s t-criterion. At the same time, areas of ineffective learning were identified that did not show significant progress, which is a systemic pattern indicating a lack of certain knowledge among students. Thus, the main barrier to the development of a number of skills was the lack of a subject and methodological base, which is formed by students, as a rule, in senior courses. It should be noted that the quality of the formulated prompts for senior students is initially higher than that of younger students due to the fact that individual modules on prompt engineering are currently included in the content of such disciplines as “ICT in Professional Field” (3rd year, 5th semester) and “Methods of Foreign Language Teaching” (3rd year, 6th semester and 4th year, 7th semester).

Secondly, in our opinion, the most advantageous prompting technique at any stage of training is the technique of auto-prompting, when the AI independently formulates the prompt, and the user has the opportunity to refine it depending on the specific task. With this approach, the focus shifts from the result to the process, and students can observe the chain of reasoning, conducting a critical analysis and forming an expert position. The technique of auto-prompting allows you to get acquainted with the anatomy of an effective prompt at the initial stage and create high-quality prompts for solving complex tasks at advanced stages.

Thirdly, prompt engineering training in the context of the digital transformation of education must begin with the first year, regardless of the direction and profile of the training of students. If prompt engineering is considered as a new subtype of communicative competence, accordingly, we should talk about its inclusion in the nomenclature of communicative skills that allow us to freely formulate queries for generative AI and receive high-quality feedback from it. The implementation of training can take place both through the inclusion of the discipline "Introduction to Artificial Intelligence" in the curriculum in the first year, and through the minor programs from the second year as part of the training at the digital department. If the student has completed a course in classical methods of teaching a foreign language and has an idea of what a technological lesson maps looks like, what components need to be identified, what universal learning actions should be described, etc., then when contacting the AI to develop a technological lesson maps , the student will be able to independently control the generation process and make the necessary changes. Another problem may be the lack of understanding among some AI technologies of the format of the response required of them, as in the case of evaluating written work according to the criteria of the Unified State Exam, as a result of which the risk of hallucinations is high.

The research perspective is to study the effectiveness of auto-prompting techniques in the training of future foreign language teachers through AI technologies. The results obtained can be used in further research on the study of prompt engineering techniques for educators or students of pedagogical programs, for the development of methods of educator prompt engineering skills, as well as in the methods of foreign language teaching.

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