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Methodology for Using ChatGPT to Develop Critical Thinking Skills in Higher Education Students

Kovalenko Oksana,
Candidate of Philological Sciences, Associate Professor,
Associate Professor at the Department of Pedagogy, Foreign Philology and Translation,
Simon Kuznets Kharkiv National University of Economics,
9-A Nauky Ave., Kharkiv, 61166, Ukraine
https//orcid.org/0000-0002-3432-2601

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Abstract: *The purpose of the article is to develop and provide a theoretical substantiation for a methodology of using ChatGPT in the educational process of higher education institutions to foster students' critical thinking at the levels of analysis, evaluation, and creation within Bloom's taxonomy. The relevance of the study is determined by the contradiction between the rapid integration of generative artificial intelligence into higher education and the insufficient methodological preparedness of educators to use this tool in ways that do not diminish cognitive engagement but, on the contrary, stimulate students' intellectual independence. The research methods include the analysis and synthesis of recent scholarly studies on the use of ChatGPT in higher education; comparison of approaches to developing higher-order thinking skills; generalisation of the findings of systematic reviews and empirical studies; modelling of instructional techniques for integrating ChatGPT into classroom activities; and designing an algorithm of students' critical interaction with a*

generative model. The results show that ChatGPT is most effective as a tool for supporting lesson planning, developing learning materials, providing timely feedback, and personalising instruction; however, in the absence of deliberate instructional design, it may encourage superficial consumption of ready-made answers, weaken independent argumentation, and promote the uncritical acceptance of inaccurate statements and fabricated sources. On this basis, the article proposes a methodology that treats ChatGPT not as a source of final knowledge but as an instrument of Socratic dialogue, an intellectual interlocutor, and an object of verification. The methodology includes a typology of tasks structured according to Bloom's taxonomy; an algorithm of critical interaction with artificial intelligence; three core instructional techniques—"hallucination verification," "comparative prompt analysis," and "AI as reviewer"; and principles for the ethical, transparent, and verifiable use of AI-generated content. It is demonstrated that the pedagogical value of ChatGPT increases under conditions of human oversight, clear prompt design, reliance on scholarly sources, and specially organised tasks in which students verify, compare, evaluate, and refine generated responses. The conclusions suggest that the proposed methodology is aimed at minimising the risk of cognitive passivity and excessive dependence on generative artificial intelligence and can be applied in the teaching of humanities, social sciences, economics, and natural sciences in blended, face-to-face, and mobile-supported learning environments.

Keywords: *generative artificial intelligence; Bloom's taxonomy; higher-order thinking skills; instructional design; response verification; academic integrity; university teaching.*

ПЕДАГОГІЧНА АКАДЕМІЯ:
НАУКОВІ ЗАПИСКИ

Методика використання ChatGPT для розвитку критичного мислення студентів закладів вищої освіти

Коваленко Оксана Юріївна,
кандидат філологічних наук, доцент, доцент кафедри педагогіки, іноземної філології та перекладу, Харківський національний економічний університет імені Семена Кузнеця, просп. Науки, 9-А, Харків, 61166, Україна
https//orcid.org/0000-0002-3432-2601

Анотація: *Мета статті полягає в розробленні та теоретичному обґрунтуванні методики використання ChatGPT у навчальному процесі закладів вищої освіти для розвитку критичного мислення студентів на рівнях аналізу, оцінювання та створення за таксономією Блума. Актуальність дослідження зумовлена суперечністю між високою швидкістю впровадження генеративного штучного інтелекту у вищу освіту та недостатньою методичною готовністю викладачів до такого використання цього інструмента, яке не знижує пізнавальну активність, а стимулює інтелектуальну самостійність студента. Методи дослідження: аналіз і синтез сучасних наукових праць щодо застосування ChatGPT у вищій освіті; порівняння підходів до розвитку навичок мислення вищого порядку; узагальнення результатів систематичних оглядів і емпіричних досліджень; моделювання методичних прийомів інтеграції ChatGPT у навчальні заняття; проєктування алгоритму критичної взаємодії студента з генеративною моделлю. Результати. Встановлено, що ChatGPT є найбільш ефективним як інструмент підтримки планування занять, створення навчальних матеріалів, надання оперативного зворотного зв'язку та персоналізації навчання, проте без спеціального методичного дизайну може провокувати поверхове споживання готових відповідей, зниження самостійної*

аргументації, некритичне прийняття помилкових тверджень і вигаданих джерел. На цій підставі запропоновано методику, яка розглядає ChatGPT не як джерело остаточного знання, а як інструмент сократичного діалогу, інтелектуального опонента й об'єкт перевірки. Методика охоплює: типологію завдань, розподілених за рівнями таксономії Блума; алгоритм критичної взаємодії зі штучним інтелектом; три базові прийоми роботи — «верифікація галюцинацій», «порівняльний аналіз промптів», «ШІ як рецензент»; правила етичного, прозорого та верифікованого використання контенту, згенерованого штучним інтелектом. Доведено, що педагогічна цінність ChatGPT зростає за умов людського нагляду, чіткого промпт-дизайну, опори на наукові джерела та спеціально організованих завдань, у яких студент перевіряє, порівнює, оцінює та доопрацьовує згенеровані відповіді. Висновки. Запропонована методика спрямована на мінімізацію ризику когнітивної пасивності й надмірної залежності від генеративного штучного інтелекту та може бути використана під час викладання дисциплін гуманітарного, соціального, економічного й природничого циклів у змішаному, аудиторному та мобільно підтриманому навчанні.

Ключові слова: *генеративний штучний інтелект; таксономія Блума; мислення вищого порядку; педагогічний дизайн; верифікація відповідей; академічна доброчесність; університетське навчання.*

Problem Statement

The rapid development of generative artificial intelligence is transforming the educational landscape of higher education, affecting lesson planning, materials development, assessment, the organisation of feedback, and the ways in which students engage in independent work. Systematic reviews devoted to the use of ChatGPT in teaching have emphasised its value as a tool for supporting educators by helping them save time, personalise instruction, and diversify pedagogical practices [1; 2]. At the

same time, researchers point to the risks of inaccuracy, bias, academic dishonesty, overreliance on AI tools, and the insufficient technological preparedness of users [1, p. 60; 2, p. 5549].

In this context, the issue of developing students' critical thinking becomes especially significant. When ChatGPT is used merely as a generator of ready-made answers, it may displace analysis, evaluation, argumentation, and the independent verification of facts. However, if it is integrated into the learning process as an object of critical analysis and a tool for dialogue, it can become a means of fostering higher-order skills. Thus, a contradiction emerges between the pedagogical potential of ChatGPT and the risk of students' cognitive passivity.

For contemporary higher education, it is essential to move from the transmission of knowledge to the development of higher-order skills, including analysis, evaluation, synthesis, verification, reflection, and reasoned decision-making. This is precisely why a methodology for using ChatGPT is needed – one that directs students not towards the passive consumption of AI-generated content, but towards its critical interpretation, verification, and refinement.

Analysis of Recent Research and Publications

In contemporary scholarly discourse, several groups of studies may be identified as particularly important for understanding the problem under consideration. First, these are systematic reviews that delineate the areas in which ChatGPT is used in higher education. In the works of L. Holubnycha and co-authors, ChatGPT is shown to be employed by educators for course and lesson planning, materials development, assessment preparation, professional development, and the organisation of the ethical use of AI [1; 2]. These studies also emphasise that ChatGPT should be regarded as a supportive rather than a substitutive resource, while the role of the educator shifts from that of a transmitter of knowledge to that of a facilitator of responsible interaction with artificial intelligence [1, p. 60; 2, p. 5552].

Similar conclusions are presented in the studies by Y. Albadarin and co-authors, B. Ogunleye and co-authors, A. Yusuf and co-authors, and G. M. Sekli and co-authors, in which ChatGPT, and generative AI more broadly, is described as a factor transforming teaching practices, assessment, academic writing, individualisation, and feedback [3–6]. At the same time, the researchers stress that the positive effect of AI depends on context, instructions, digital literacy, and pedagogical design rather than on the mere fact of using the tool itself.

Second, an important group of studies focuses on assessment and higher-order cognitive skills. In the scoping review by Q. Xia and co-authors, generative AI is examined as a resource for change in assessment in higher education, though with reservations regarding reliability, academic integrity, and the necessity of human verification [7]. E. Kasneci and co-authors emphasise that large language models open up significant opportunities for education, yet at the same time create risks of superficiality, standardisation of thinking, and uncontrolled use [8]. In the systematic review by N. Cong-Lem and co-authors, particular attention is paid to the limitations of ChatGPT, including its tendency to produce errors, fabricated facts, logical inconsistencies, and inaccurate explanations [9].

Third, the issue of critical thinking is addressed directly by A. Essien and co-authors, who examine the influence of AI text generators on critical thinking skills in UK business schools. The authors demonstrate that AI tools can support work with information at basic levels; however, without deliberate pedagogical organisation, their impact on analysis, evaluation, and argumentation remains limited [10]. A similar position is taken by Y. Guo and D. Lee, who propose the use of ChatGPT for the development of critical thinking skills through tasks requiring students to ask clarifying questions, compare responses, verify them against scholarly sources, and reflect on the quality of argumentation [11].

Fourth, an important body of literature addresses the academic reliability of AI-generated responses. T. Day demonstrates that ChatGPT can produce fake peer-

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reviewed references and incorrect bibliographic descriptions, which is particularly dangerous in academic learning [12]. This conclusion is of fundamental importance for the development of a methodology aimed at fostering critical thinking: students must learn not only to generate text with the assistance of AI, but also to verify sources, identify hallucinations, and assess the reliability of content.

Fifth, a number of publications consider the acceptance of ChatGPT within the academic community, the readiness of educators and students to use it, as well as the relationship between mobile accessibility and the individualisation of learning. A. Strzelecki and co-authors, N. Saif and co-authors, and K. Lavidas and co-authors show that the use of AI in education is directly associated with perceived usefulness, ease of use, ubiquitous learning, real-time support, and personalised feedback [13–15]. In the authors' previous review, the mobile accessibility of ChatGPT on smartphones and tablets was likewise highlighted as a factor expanding the possibilities of microlearning and just-in-time feedback [1, p. 57–60].

Thus, the existing body of publications provides an important theoretical foundation; however, it mainly describes the areas in which ChatGPT is used in higher education, its general advantages and risks, users' attitudes, and issues of assessment and ethics. What remains less developed is precisely the methodological dimension of fostering students' critical thinking through ChatGPT, that is, a system of specific techniques, algorithms, task types, and instructor roles capable of moving interaction with artificial intelligence to the level of analysis and evaluation.

Identification of Previously Unresolved Aspects of the General Problem

Despite the rapid accumulation of studies, the scholarly literature still lacks sufficiently developed methodological algorithms for using ChatGPT specifically to foster critical thinking. Systematic reviews indicate that ChatGPT performs well as a tool for generating materials, explanations, test items, and personalised feedback [1–3; 7]; however, this does not automatically lead to the development of students' higher-order thinking skills.

A synthesis of previous research suggests that ChatGPT more effectively supports basic cognitive operations associated with remembering and understanding, whereas its contribution to the levels of analysis, evaluation, and creation is far more dependent on the prompt, the context, and the pedagogical design [1, p. 53; 10; 11]. The following issues remain unresolved: what the algorithm of a student's critical interaction with AI should look like; which types of tasks stimulate verification rather than copying of an AI-generated response; how ChatGPT may be aligned with Bloom's taxonomy; how students can be taught to identify hallucinations, bias, and false references; and what the facilitator role of the educator should be in such a process.

It is precisely the attempt to address this gap that constitutes the main contribution of the present article.

Purpose of the Article and Research Objectives

The purpose of the article is to develop and provide a theoretical substantiation for a methodology of integrating ChatGPT into classroom instruction in order to foster students' analytical and evaluative skills in higher education institutions.

To achieve this purpose, the following research objectives were defined:

1) to synthesise contemporary scholarly approaches to the use of ChatGPT in higher education, with a particular focus on critical thinking; 2) to adapt Bloom's taxonomy to tasks involving students' interaction with generative artificial intelligence; 3) to develop a system of instructional techniques that encourage the verification, comparison, argumentation, and evaluation of AI-generated responses; 4) to propose an algorithm of students' critical interaction with ChatGPT; 5) to formulate recommendations for the ethical and verifiable use of AI-generated content in higher education.

Main Findings of the Study

The theoretical foundation of the proposed methodology rests on the combination of three key propositions. First, ChatGPT should be regarded as a pedagogical supplement rather than a substitute, that is, as a support tool that does not

replace the professional judgement of the educator or eliminate the student's intellectual effort [1; 2; 8]. Second, critical thinking does not emerge automatically as a result of technological innovation; rather, it is formed through deliberately organised cognitive actions, including analysis, verification, argumentation, evaluation, and reflection [10; 11]. Third, the quality of interaction with ChatGPT is determined not only by the quality of the model itself, but also by the quality of the prompt, the context of use, digital literacy, and the ethical framework within which the tool is employed [9; 13; 14].

Within this logic, ChatGPT may appropriately be positioned as a "Socratic interlocutor" that provokes questions, doubt, clarification, and comparison. The student's task is not merely to obtain an answer, but to enter into a critical dialogue with it: to identify its main claims, verify the evidence, detect weaknesses, and propose either a stronger argument or a revised version of the response. Accordingly, the role of the educator also changes: rather than acting as a controller of every step, the educator becomes a facilitator who models the ethical use of AI, teaches criteria for verification, and helps shift the tool from the mode of a "ready-made answer" to that of an "intellectual training device."

The practical value of such a methodology becomes particularly evident in the context of BYOD and mobile-supported learning, where ChatGPT is accessible to students at any time on smartphones and tablets, thereby enabling micro-tasks, rapid hypothesis checking, timely feedback, and the comparison of different response options beyond the constraints of the classroom [1, p. 57–60; 15]. At the same time, however, mobile accessibility increases the risk of uncontrolled copying and the superficial consumption of results, which makes a clearly formulated algorithm of critical interaction especially necessary.

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Table 1.

Typology of Learning Tasks for Developing Critical Thinking across the Levels of Bloom's Taxonomy through the Use of ChatGPT

Level	Cognitive Action	Example of a ChatGPT-Based Task	Expected Outcome
Remembering	Identifying concepts	Ask ChatGPT to provide five key concepts related to the topic; the student must remove duplicates and revise the definitions.	Consolidation of basic terms
Understanding	Explaining, paraphrasing	Obtain an explanation of a complex concept and rewrite it for a fellow student without losing the core meaning.	Meaningful comprehension of the content
Applying	Using knowledge in a case	Apply the AI-generated explanation to the analysis of a specific situation or problem.	Transfer of knowledge into practice
Analysing	Breaking down argumentation	Break ChatGPT's response into claims, arguments, assumptions, and unverified statements.	Identification of structure and weak points
Evaluating	Verifying and critically selecting	Compare ChatGPT's response with two scholarly sources; determine its accuracy, bias, and missing aspects.	Reasoned evaluation of quality
Creating	Improving and generating a new solution	Formulate an improved prompt and produce your own response on the basis of verified sources.	Production of an original outcome

Source: developed by the author on the basis of [10; 11].

The adaptation of Bloom's taxonomy to ChatGPT-based tasks involves a fundamental shift in focus: whereas at the lower levels the student may use AI to select materials and clarify concepts, at the levels of analysis, evaluation, and creation the AI-generated response itself becomes the object of learning activity. It is treated as a draft, a hypothesis, a discussion position, or a "text for verification." It is precisely this approach that moves ChatGPT from the sphere of automation into the sphere of critical thinking development.

The basic algorithm of a student's critical interaction with ChatGPT may be described as a sequence of five steps: 1) formulate the prompt; 2) break the response down into verifiable elements; 3) compare the information with scholarly sources; 4) assess its accuracy, completeness, bias, and logic; 5) reformulate or revise the response on the basis of verified data. Such an algorithm provides the student with a clear cognitive framework and prevents passive copying.

Figure 1.

Algorithm of a Student's Critical Interaction with a Generative AI

Step	Stage	Student Action
1	Prompt formulation	Formulate the learning task and the prompt.
2	Response decomposition	Identify the main claims, facts, arguments, and assumptions in the AI-generated response.
3	Verification	Check the information against scholarly sources.
4	Evaluation	Assess accuracy, bias, omissions, and logical coherence.
5	Reconstruction	Revise, refine, or rewrite the response on the basis of verified data.

Source: developed by the author.

Within the proposed methodology, it is advisable to employ three core instructional techniques:

1. The "Hallucination Verification" Method. The student receives a ChatGPT response to an academic question and is required to identify factual errors, fabricated quotations, incorrect sources, or biased formulations within it. For example, the task may be formulated as follows: "Ask ChatGPT: 'Explain three contemporary pedagogical strategies for developing critical thinking in higher education and provide scholarly sources.' After receiving the response, verify whether

the cited articles actually exist, whether their content has been represented correctly, whether the DOIs are authentic, and whether the conclusions correspond to the real data." Such an exercise directly develops skills in fact-checking, source criticism, and academic integrity, while its necessity is confirmed by evidence that ChatGPT may generate fake references [12].

2. The "Comparative Prompt Analysis" Method. The student formulates two or three prompts of varying degrees of specificity in relation to the same problem and then compares the resulting responses according to the criteria of accuracy, depth, logical coherence, balance, and suitability for scholarly work. For example, one may compare the general prompt "Explain critical thinking" with the structured prompt "Explain critical thinking in higher education; provide three defining features, two risks of superficial AI use, and two examples of tasks for analysing a ChatGPT response." This exercise demonstrates to students that the quality of an AI-generated response depends substantially on the quality of the prompt and that prompt design is, in itself, an intellectual activity [9; 14].

3. The "AI as Reviewer" Method. The student submits to ChatGPT a short draft essay, a presentation outline, or a response to a case study and receives feedback from the model. The task then is not to accept this feedback automatically, but to evaluate it critically: which recommendations are useful, which are superficial, which are incorrect, what has been omitted, and which comments require correction. After that, the student is asked to prepare a short meta-commentary indicating what exactly from the AI-generated feedback will be taken into account, what will be rejected, and why. This approach teaches students to evaluate not only their own writing, but also the quality of the reviewing process itself.

The proposed techniques may be applied in the humanities, the social and economic sciences, as well as in the natural sciences. In language education, these may include exercises aimed at checking argumentation, style, and the accuracy of

references; in management, the analysis of business cases and the evaluation of decisions; in pedagogy, the verification of methodological recommendations and the comparison of theoretical approaches; and in natural science courses, the evaluation of conceptual explanations and the logic of problem-solving. The key point is that ChatGPT should not resolve the intellectual problem on the student's behalf, but rather open up a space for analysis.

The ethical dimension also requires special consideration. It is advisable to include at least seven groups of risks in lesson plans involving ChatGPT: 1) hallucinations and inaccuracy; 2) fake or distorted sources; 3) algorithmic bias; 4) academic dishonesty and concealed authorship; 5) privacy risks associated with entering personal data or student work; 6) the reduction of cognitive independence due to overreliance; 7) unequal access to high-quality AI tools. In view of this, the educator should formulate clear rules for the transparent use of AI: mandatory disclosure of instances in which ChatGPT has been used, prohibition of entering sensitive data, the requirement to verify facts against scholarly sources, and the inadmissibility of submitting AI-generated text as entirely one's own [1; 2; 7; 8].

Thus, the practical dimension of the methodology lies not in simply "allowing or prohibiting ChatGPT," but in transferring its use into a productive pedagogical mode. What is pedagogically valuable is a form of interaction with AI in which the student is required to justify, refute, уточнити, reconstruct, and assume responsibility for the final result.

Conclusions

The article develops and provides a theoretical substantiation for a methodology of using ChatGPT to foster critical thinking among students in higher education institutions. It has been established that generative artificial intelligence possesses considerable pedagogical potential as a supportive learning tool; however, without purposeful instructional design, it may reinforce superficial learning, dependence on ready-made answers, and the uncritical acceptance of information.

The stated purpose was achieved through the following: synthesising contemporary research on the use of ChatGPT in higher education; adapting Bloom's taxonomy to AI-mediated learning tasks; defining the role of ChatGPT as a Socratic interlocutor, an intellectual opponent, and an object of verification; developing three core instructional techniques—"hallucination verification," "comparative prompt analysis," and "AI as reviewer"; and formulating both an algorithm of students' critical interaction with a generative model and ethical principles governing its use.

The proposed methodology is aimed at minimising the risk of cognitive passivity and excessive dependence on generative AI, as it shifts the focus from the automatic reception of an answer to its critical interpretation, verification, and refinement. The practical significance of the study lies in the possibility of applying this methodology across different disciplines and learning formats, including blended and mobile-supported environments.

We see prospects for further research in the empirical testing of the effectiveness of the proposed methodology across different fields of study, in comparing student outcomes under different scenarios of AI integration, and in examining the long-term impact of ChatGPT on the development of professional competences, academic writing, and a culture of responsible artificial intelligence use.

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