

DEVELOPING CRITICAL THINKING SKILLS THROUGH ARTIFICIAL INTELLIGENCE AND LANGUAGE LEARNING

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INTRODUCTION

As Ukrainian society undergoes complex transformations in a globalized and evolving world, the question of preparing future teachers takes on an urgent relevance. The need for skilled educators capable of cultivating high-level learning through critical thinking, informed debate, and professional expertise becomes increasingly evident. The new direction of critical thinking development deals with Artificial Intelligence (AI), which is the “simulation of human intelligence processes by machines, especially computer systems”¹. Scientific opinion increasingly supports the implementation of AI as a means of facilitating critical thinking formation during language learning.

Radical changes within modern educational society reflect the global tendencies of AI implementation. Scientists stress the necessity of AI involvement in various levels of secondary and higher education along with mastering foreign language skills. The modern employer has to be an active member of the open democratic society, which is characterized by the increasing importance of AI implementation. Within such conditions the first place is given to the ability to analyze the received information in native and foreign languages, to check it, to maintain the true statement in native and foreign languages, to make decisions, and to defend own position confidently in native and foreign languages. The new generation must think logically, and dynamically, to understand the reasons for thinking of other people. This is the description of education of the creative, independent, intellectual modern professional who is characterized by a high level of critical thinking.

Critical thinking is not just a “nice to have” skill in the 21st century, it is crucial because we live in an informational society that has deepened its fingertips into the AI universe. The rapidly advancing technology exists in various educational fields – humanitarian and non-humanitarian. Still, we would like to focus on the opportunity to form critical thinking within the educational processes oriented toward mastering foreign languages via AI

¹ Marienko M. B., Shyshkina M. Il., Konoval O. A. Methodological principles of formation of cloud-oriented systems of open science in institutions of higher pedagogical education. *Information Technologies and Learning Tools*. 2022. Vol. 89. № 3. P. 209–232. <https://doi.org/10.33407/ilt.v89i3.4981>

because this will allow us to keep up with the vast and ever-growing amounts of information.

Teaching critical thinking skills via AI is a vital part of any educational level, but it requires a mindful approach from the teacher.

It also makes students think critically and thoughtfully about challenging topics in native and non-native languages to develop well-reasoned opinions, which are of great need for further effective activity.

In the case of the proper guidance, theory, and regular practice of critical thinking skills (during foreign language learning) students can master problem-solving skills via AI. With this in mind, teaching critical thinking skills effectively via AI is incredibly important for equipping students with the tools they need for success in the 21st century.

1. Problem formulation and purpose of the study

Although recognizing the importance of critical thinking in 21st-century education, simply pushing schools to teach it through scattered initiatives is insufficient. Ukraine's efforts necessitate a well-structured and systemic approach, where teacher knowledge and development hold the key to unlocking students' critical thinking potential considering AI.

Teaching students to think critically during foreign language learning via AI is one of the essential skills they can gain because they need to lead analytic reasoning, and problem-solving, to create innovative ideas. When these abilities are formed, students can continue their personal/professional development within their further professional activity.

Research on a globally renowned critical thinking initiative highlights a crucial missing piece: teacher and students' knowledge. The initiative seems to have overlooked equipping teachers with the necessary skills to effectively guide students using AI. This knowledge gap stems from both shortcomings in pre-service education and inadequate professional development for current teachers.

2. Analysis of relevant research

Integrating Ukrainian education into the European educational space does indeed elevate the significance of foreign language learning, transforming it from just a subject into a crucial tool for acquiring essential critical thinking skills and abilities to use AI. Foreign language communicative competence, or the ability to effectively communicate in another language, is crucial for success in today's society. It goes beyond simply knowing grammar and vocabulary and encompasses various skills like comprehension, fluency, and cultural understanding. Partnership pedagogy is a crucial element of the "New Ukrainian School" reform and holds immense potential for transforming

education in Ukraine using new AI technologies. The New Ukrainian School aims to graduate adaptable individuals, equipped with critical thinking skills to navigate an ever-changing digitalized world. Knowledge is not about static facts but about the ability to find, analyze, and apply information for independent decision-making.

The question of the importance of AI and critical thinking in the educational process was investigated by V. Bryushynkin, E. Ivanov, Y. Komenskyi, I. Nikolska, V. Osynska, V. Palamarchuk, who noted that "logic is the art of correctly directing the mind to the knowledge of things, to which they run both to learn it themselves and to teach others, forming the critical thinkers for the modern world". They underline that thought processes are intricately tied to the surrounding context, and attempting to isolate them from the broader context of the school curriculum or everyday life is not an optimal approach for learning critical thinking. The most effective method for teaching critical thinking in school involves integrating AI for the formation of this cognitive skill into various contexts that are inherent to, or anticipated outcomes of, the daily curriculum. In essence, critical thinking is best learned when applied to real-world scenarios and subject-specific contexts within the educational framework which could be proposed by AI.

Critical thinking has become an integral component of modern education, driven by the inherent demands of professions that require constant application of logical techniques and methods. The ability to employ logical tools such as definitions, classifications, arguments, and objections is crucial for individuals in various fields such as economists, politicians, businessmen, designers, researchers, and programmers. Acquiring knowledge of the rules governing argumentation and criticism, as well as understanding permitted and prohibited methods of discussion, enhances the effectiveness and success of professionals in these diverse domains.

Researchers such as V. Yevdokimov, V. Zhuravlyov, F. Ilyina, O. Tikhomirova, O. Fedorenko, Khachimyan, N. Chernega, and others have delved into the formation of critical thinking through English Language Teaching (ELT). Analysis of these studies suggests that critical thinking is essential for tasks such as problem-solving, drawing conclusions, conducting reliable evaluations, and making informed decisions. This form of thinking is characterized by purposefulness, controllability, and reasonableness, as individuals utilize appropriate "skills that are well-founded and effective for a specific situation." The research highlights the integral role of critical thinking in the language learning process.

According to researchers K. Hall and H. Lindsey, critical thinking is a form of thinking that leads to the discovery of fundamentally new or improved solutions to specific tasks. It involves evaluating proposed solutions to

determine their potential application and serves as a method of verifying ideas in the quest for more effective and innovative approaches. In essence, critical thinking, as conceptualized by Hall and Lindsey, involves a process of rigorous examination and discernment to arrive at novel or enhanced solutions.

The examination of the key components involved in teaching critical thinking through English Language Teaching (ELT) considering AI sheds light on the knowledge, skills, and beliefs that teachers, tasked with fostering critical thinkers, should possess. A growing body of research underscores the connection between teachers' knowledge, beliefs, and the actual instruction of critical thinking in the classroom. Notable studies by Nagappan and Gruberman (2015) specifically address issues related to teacher knowledge in the context of teaching critical thinking. Nagappan's findings, for instance, reveal several noteworthy points:

Teachers often do not perceive themselves as adequately prepared to teach higher-order thinking considering AI, and such perceptions are linked to their teaching experience.

Teachers may lack the pedagogical content knowledge necessary to effectively teach higher-order thinking skills.

Inconsistencies exist between teachers' stated beliefs about teaching critical thinking and their actual instructional practices of AI implementation.

Mandates for higher-order thinking in education, as well as teacher education and professional development initiatives, have limited impact on teachers' pedagogy.

Curricular demands are seen as constraints in the implementation of higher-order thinking instruction in classrooms.

These findings underscore the complex interplay between teacher preparation, beliefs, and the practical challenges associated with integrating critical thinking into the educational context. Addressing these aspects is crucial for enhancing the effectiveness of critical thinking instruction in ELT considering AI technologies.

Talking about AI the implementation of the Thinking Skills emphasizes the pivotal role of teachers in the successful integration of thinking skills into the curriculum, highlighting the significance of teacher efficacy. This aligns with the recognition that successful thinking initiatives hinge on teacher effectiveness.

Furthermore, the majority of scholars underscore the essential roles played by both the school and teachers in the effective incorporation of critical thinking via AI into the curriculum. This emphasizes the need for a comprehensive approach that involves not only individual teachers but also the broader educational environment to successfully integrate thinking skills

into the learning experience via AI. Some schools were implementing critical thinking via AI in a 'shallow way' and the enactment of it was merely seen as "a grab-bag of thinking tools and strategies". This could be attributable to teachers' lack of a knowledge base of thinking instruction and schools' general attitude in largely remaining 'results-focused and content driven'. The true 'Thinking School' incorporates critical thinking as an all-encompassing philosophy in which the school's practices, culture, and surroundings all advocate and encourage good thinking via AI. Critical thinking of the future specialist is reasonably flexible, reflective, and productive in achieving its ends or goals concerning making decisions, solving problems, or developing understanding' is the effective equivalent of good critical thinking.

Indeed, establishing successful "Thinking Schools" necessitates a profound paradigm shift that spans all levels and aspects of the educational institution to the implementation of AI. Achieving effective implementation of technologies for the formation of critical thinking in the curriculum requires a comprehensive transformation that goes beyond individual classrooms or teachers and deals with AI. It involves redefining the school's overarching philosophy, pedagogical approaches, and administrative practices to foster an environment where critical thinking is not only encouraged but deeply embedded in the school's culture. This holistic transformation is essential to creating an educational setting that consistently and authentically promotes and supports the development of critical thinking skills among students.

Critical thinking is indispensable for contemporary professionals as it profoundly influences the efficacy of the educational process. The clarity of concepts to be learned, the precise articulation of problems within the learning process, and the rationale behind the teacher's statements are crucial factors determining effectiveness. The acquisition of critical thinking skills, and consequently, the development of a logical culture, enhances success in teaching, scientific research, and overall political engagement.

Students should learn that Logic, as the study of human thinking, is instrumental in attaining truth by ensuring that original propositions are true and interconnected following the laws and rules of logic. Consequently, logic serves as the primary foundation for critical thinking, characterized by attributes such as consistency and evidentiality. The Logic is described as that which brings order to the world—a timeless, objective, universal, and enduring regularity that could be supported by the ration implementation of AI.

3. Results and discussions

Berdiansk State Pedagogical University (Ukraine) offers the special course "Critical Thinking of a Future Specialist via ELT", designed to master crucial knowledge and skills for critical thinking formation. Our students learn

that formal logic delves into the principles of true and rational thinking, analyzing its structures (concepts, judgments, conclusions) by focusing on their construction while abstracting from the specific content they reflect. In contrast, informal logic scrutinizes thinking as a tool for comprehending the objective world, exploring its forms and the laws through which the world is mirrored in the cognitive process. In the philosophical dictionary, thinking is defined as "the creative ability of a person, formed and developed in the process of his labor activity, it is the highest form of cognition".

During the course, students study that the core of thinking lies in the ability to contemplate and represent the essence of objects and processes in the objective world through abstractions. Critical thinking stands as a crucial component of human consciousness, embodying an abstract-rational, intellectual capability closely intertwined with empirical observations. After the work with the material, they have to prepare small presentations and prove their thoughts or opinions.

Thinking acquires input from the senses and engages in the manipulation or transformation of internal representations. That's why we offer students to manifest themselves through speech, enabling individuals not only to broaden the scope of sensory observation but also to convey accumulated experiences to others through speech communication. Researching thinking is a complex and multifaceted endeavor so we suggest students the project work that deals with the relevant problems for our country. The unique aspect of logic's approach to studying thinking is its interest in both the content of thinking and the forms through which this content becomes apparent, that's why we suggest them to choose the topic for the discussion.

Thinking is a subject of study for various scientific disciplines, each examining its developmental patterns and essence under its specific focus. Psychology, for instance, explores thinking in the context of all its types. In psychology, thinking is viewed as the embodiment of a particular activity by the subject, driven by the individual's interests and needs, which hold value for them.

Different types of thinking are delineated based on various characteristics. The nature of the tasks to be solved distinguishes theoretical thinking from practical thinking. Additionally, thinking can be categorized according to the degree of originality, with reproductive thinking representing routine and unoriginal processes, while productive thinking involves creative and innovative approaches.

We recommend our students explore various modes of thinking and find some samples with the help of AI. They are encouraged to read the content, translate it, and prove their own opinion.

Task 1. Read the information, and translate it. Do you agree with the statements? Why?/Why not? Find some samples of implementation with the help of AI.

Dialectical thinking: This involves the ability to recognize contradictions within phenomena, identify developmental trends, and discern the emergence of new elements.

Abstract thinking: It entails the capacity to abstract from insignificant or secondary features, focusing on the extraction of general and essential aspects, ultimately leading to the formation of abstract concepts.

Generalizing thinking: Involves the ability to identify general principles and methods of action that apply to a specific set of phenomena.

Categorical thinking: Refers to the capacity to group concepts into classes and categories based on essential signs of similarity.

Theoretical thinking: Encompasses the ability to assimilate highly generalized knowledge, comprehend the scientific foundations of specific fields of knowledge, and recognize the dependencies and regularities existing among phenomena.

Inductive thinking: This signifies the process of thought moving from the individual to the general, progressing from specific facts to broader generalizations.

Deductive thinking: Involves the movement of thought from the general to the specific, starting with overarching principles and narrowing down to specific instances.

Algorithmic thinking: Involves strictly adhering to instructions that prescribe a precise sequence of actions, ensuring the attainment of a specific result.

Technical thinking: Encompasses an understanding of scientific principles and general production processes.

Reproductive thinking: Encompasses the application of acquired knowledge to solve tasks of a familiar type or perform actions in known conditions.

Productive thinking: Involves an individual's independent resolution of new tasks based on acquired knowledge, as well as the application of new information, methods, and tools necessary for their solution.

Systematic thinking: Involves the ability to recognize connections between various sciences, understand general scientific laws that underpin their development, and possess overarching insights into the regularities governing the development of nature and society.

Logical thinking: This entails establishing generalized connections between new knowledge and previously acquired information, and organizing them into a coherent system.

Critical thinking: Represents a process in which an individual can characterize a phenomenon or object, express their perspective through debates or reasoned arguments, and identify solutions to various situations.

This is the answer of one of our students: “Critical thinking, derived from the Greek term "κριτική τέχνη" meaning "the art of analysis, judgment," refers to a form of scientific thinking characterized by the deliberate and independent formulation of decisions. Notable features of critical thinking include heightened awareness and a commitment to self-improvement. It involves the meticulous examination and analysis of information, enabling individuals to make well-considered and reasoned judgments.”

Indeed, critical thinking has a rich historical foundation, with roots traceable to early Greek philosophers like Plato and Socrates. Its relevance persists into the modern age, where it plays a vital role in honing skills such as discerning fake news, fostering reflective and independent thinking, encouraging active learning rather than passive information reception, and systematically identifying, analyzing, and solving problems. The enduring importance of critical thinking reflects its adaptability and value in navigating the complexities of information and decision-making across different eras.”

In this context, fostering critical thinking plays a crucial role in advancing contemporary education and enhancing the effectiveness of AI in English language lessons. The importance of this subject stems from society's practical demand for individuals with specific cognitive abilities. There is one more issue – the need to implement AI into our daily lives. Nowadays AI can be met in different fields: smart cities (upgrading of civil life), legal systems (automatical analysis data), media (searching for information, true or false news), weather forecast (analysis of the meteorological data), business (stock analysis, investments' analysis), medicine (robots-surgeons, E-med cards). The AI proves its mobility, relevance, and importance. Thus, the majority of specialists have to be well-trained for the work with it. Thus, the implementation of AI into the learning processes is a burning problem especially due to its ability to improve the educational process directed at the formation of the personality with the high level of critical thinking.

The advocacy for integrating critical thinking in light of AI technologies into English Language Teaching (ELT) as a fundamental aspect of education deals with the rapidly changing progress. Presently, critical thinking considering AI is gaining acknowledgment as a key principle in education, essential for preparing future citizens to navigate the evolving global economic landscape.

The clear acknowledgment of critical thinking as a crucial component of education is evident in the reassessment of educational objectives by policymakers and education stakeholders who are interested in new

approaches to education. The inclusion of AI into critical thinking formation has become an integral part of the educational reform agenda, highlighting its significance in shaping the direction of education. Some of the globally recognized high-performing educational systems include those in America, the UK, and Singapore, as noted by McKinsey in 2021. Additionally, educational systems in the Asia Pacific region, including Malaysia and Australia, have initiated comparable reforms. These systems have strategically integrated critical thinking as a pivotal element in their educational goals, emphasizing its prominent presence in curriculum documents and as a focal point for teacher professional development, as highlighted by Nagappan, ACARA (2014), and Dixon, Moss, Ferguson, etc.

The capacity for critical thinking considering AI is not just a valuable skill but is deemed essential for navigating an ever-evolving digitalized world and serves as the cornerstone of the contemporary education system, as asserted by Berliner (2019), Leiman (2015), etc. Cultivating the ability to think critically is imperative in a swiftly changing environment that places greater demands on individuals in their personal, social, and professional realms. The unprecedented influence of globalization underscores the intellectual need to adeptly navigate one's personal and social spheres, which are continually shaped by global forces that demand the implementation of AI. This skill is arguably indispensable for 21st-century citizens, as highlighted by Halpern (2003), who must not only survive but thrive in this dynamic landscape. Moreover, the scientific society raises a thought-provoking question, "Will we be smart enough to use AI?" in examining the skills required by the workforce of tomorrow, contending that the quality of individuals' lives and even the future state of the planet hinges on how this question is addressed.

The shift in the educational paradigm towards prioritizing the development of critical thinking using AI technologies can be attributed to the imperative of preparing tomorrow's citizens to thrive in an increasingly intricate world. Without the capacity for critical thinking, individuals would face significant challenges in addressing a myriad of complex tasks and roles. Furthermore, if contemporary education systems bear the responsibility of shaping the workforce and global citizens of the future, it can be argued that the ability to think critically holds a central position in both schooling and the curriculum. Moreover, the emergence of the Information Age and the increasing impact of the Internet underscore the necessity for educational systems aiming to prepare future citizens for an ever-globalizing world to integrate critical thinking into their curriculum. Renowned educationists, such as Dewey (1938), Costa (2001), Lipman (2003), Paul (1995), and Winch (2006), emphasize the significance of critical-minded citizens in democratic societies. They argue that effective citizenship demands individuals to possess

intellectual autonomy using AI, enabling them to form independent opinions and make informed decisions. This intellectual independence, rooted in critical-mindedness rather than passive compliance, is considered a cornerstone for flourishing democracies.

The understanding and application of critical thinking via ELT and AI are intricately linked to context. Attempting to isolate thinking from the broader context of the school curriculum or daily life may not be the most effective approach to learning critical thinking. The optimal method for teaching critical thinking in school involves integrating this type of thinking into various contexts that are inherent to, or expected outcomes of, the daily curriculum using AI technologies. By incorporating critical thinking skills into real-life scenarios and subject-specific contexts, students can better grasp and apply these skills in a meaningful way, fostering a more holistic and practical approach to learning.

We recommend our students to read these opinions and read their thoughts about them. After that, they have to ask the ChatGPT to give its opinion. Then they compare its answer with the answers of their group mates.

Task 2. Read and write your thoughts about the sample. Ask the ChatGPT to write its thoughts. Print the answer. Exchange with your group mates. Compare and underline the answers. Try to guess which is the AI answer.

Samples for the task.

Effective, long-term learning EL/LL that can be applied to new situations is essentially about finding meaning in information and ideas. This is best achieved when students actively participate in the learning process, realizing, synthesizing, and mastering information in EL/LL (Anderson, Hiebert, Scott, & Wilkinson, 1985).

Students learn EL/LL more effectively when they use a full repertoire of thinking strategies. It is with the help of these strategies in the situation of meaningful learning that students become aware of the learning process (Palinksar and Brown, 1989).

The learning process and critical thinking are more effective when students have opportunities to apply the acquired knowledge to real-life problems (Reznik, 1987).

Learning literature becomes more effective when it builds on students' prior knowledge and experience, allowing them to relate existing information to what has just been learned (Roth, 1990).

Critical thinking and learning Literature and language are successful when teachers understand and value the diversity of ideas and experiences. Critical thinking is encouraged in the absence of a "one right answer" policy (Bank, 1988).

Critical thinking is not the same thing as intelligence. The ability to reach sound conclusions based on observation and information. –Richard Paul (1988).

Assessing the authenticity, accuracy, and worth of knowledge, claims, beliefs, or arguments. – Barry Byer (2013).

A way of thinking that helps students “apply everything they already know and feel, to evaluate their thinking, and especially to change their behavior. Critical thinking does not increase or improve with age. College students sometimes score the equivalent of sixth graders.... We need to practice regularly” – Stephen Norris (2017, p. 40–45).

Professor Robert H. Johnson from Canada defines critical thinking as a special kind of mental activity that allows a person to make a sound judgment about his proposed point of view and behaviors.

German scientists (R. Paul and L. Elder) define critical thinking as a kind of thinking (this applies to all items of content or problems) in which a person improves the quality of his thinking, making it an integral part of his life. It involves mastering certain qualities of thinking and leads to the development of creative abilities in communication and solving problems.

Indeed, critical thinking for an English language teacher involves a dynamic process of analyzing, synthesizing, and assessing the reliability or value of information that could be found with the help of AI. It encompasses understanding the logical connections between ideas. An English language teacher with a high level of critical thinking perceives situations globally, explores alternative reasons, and is capable of generating or altering their position based on facts and arguments. Furthermore, they adeptly apply the results obtained through critical thinking to problem-solving.

In the context of English Language and Literature, critical thinking is an ongoing process embedded in activities such as reading, writing, speaking, and listening. AI serves as a platform for comprehending, analyzing, and effectively engaging with language and literary content. The application of critical thinking in these language-based activities via AI enhances the teacher's ability to navigate and interpret diverse linguistic and literary elements.

Certainly, in addition to relevant knowledge, English Language Teaching (ELT) teachers must possess pedagogical beliefs and attitudes that align with the goals of teaching thinking. Scholars emphasize the significance of these pedagogical dispositions. The effective teaching of thinking through ELT necessitates a departure from instructional approaches grounded in "teaching by telling, learning by memorizing," which he terms 'didacticism.' In other words, the successful integration of critical thinking into language teaching requires educators to move beyond traditional didactic methods and embrace

more interactive and participatory approaches that foster independent thought and active engagement among students who must be trained to work with AI.

We think that the effective teaching of critical thinking within English Language Teaching (ELT) via AI requires a shift in fundamental instructional assumptions toward more progressive terms. This shift involves recognizing that learning and knowledge acquisition are inseparable from thinking. In this view, knowledge and learning are actively produced through critical thinking, contrasting with passive information reception. This perspective redefines the teacher's role as a facilitator of learning and thinking rather than the central source of knowledge.

Teaching thinking successfully, therefore, demands constructivist teachers, and educators who embody pedagogical beliefs and attitudes consistently to actively engage and develop students' critical thinking skills. Constructivist approaches emphasize the importance of students actively constructing their understanding through meaningful interactions with content and experiences, aligning well with the objectives of promoting critical thinking within ELT via AI.

Due to our special course, we receive the results that prove that proficiency in critical thinking equips individuals, especially students, with invaluable tools for processing a diverse range of information encountered during professional and pedagogical training. This skill enables them to discern essentials from peripheral information, engage in critical evaluation of material, define and categorize concepts, choose methods to substantiate valid statements and identify and rectify errors. These abilities contribute significantly to their ability to navigate the complexities of their academic pursuits and future professional activities. We aim to cultivate in future teachers a profound understanding of the underlying logic in the subjects they teach, the cause-and-effect relationships within studied phenomena, and the critical thinking processes. This involves instilling skills in scientific thinking, abstract reasoning, generalization, drawing conclusions, and fostering high mental activity.

The training of prospective educators should be grounded in a robust foundation of logical knowledge, an especially crucial aspect in our contemporary era marked by transformations not only in state educational institutions but also in the labor market. Proficiency in logical knowledge, adeptly applied in practical situations, plays a pivotal role in shaping self-awareness and intellectual growth in future teachers. This, in turn, equips them to comprehend the intricate interconnections in social phenomena and engage in reasoned debates with adversaries in their future professional practice.

Critical thinking skills play a vital role in fostering a healthy workplace environment within the digitalized society. Individuals at all levels are often

tasked with addressing challenges inherent to their areas of expertise. Consequently, the greater the utilization of critical thinking skills in a workplace, the more effective the decision-making process becomes, leading to fewer errors.

Moreover, critical thinking skills contribute to personal growth by encouraging intellectual self-improvement. They prompt individuals to objectively assess their performance by considering hard facts. Additionally, these skills enhance one's ability to collaborate within a team, as emotional factors like ego are less likely to cloud judgment.

Furthermore, critical thinking skills are conducive to creativity, as they encourage making logical connections across various subjects. This broader perspective fosters creativity by promoting a mindset that explores diverse possibilities and connections.

We offer our students the table which helps them to understand the meaning of critical thinking skills.

CT Skills	Guiding questions
Interpretation	How do I interpret this situation? What knowledge do I need to understand this situation?
Analyze	What information is relevant for me to understand this situation part by part? Is there logic / meaning in the actions?
Evaluation	What information can be grouped to identify a problem? Are there strengths and weaknesses in actions?
Inference	What are the problems identified and which are the priorities that require interventions? To what conclusions could I arrive at in relation to the problems?
Explanation	Based on the identified problems, how should the actions be planned? How would you act in this situation?
Self-evaluation	What is the most coherent and objective way for me to act in this situation? Are my judgments about actions rational or influenced by prejudices?

You can detailise the intellectual skills associated with critical thinking for the written tasks:

1. analysis and drawing conclusions;
2. extending and formulating hypotheses for further development;
3. activating previously acquired knowledge;
4. recognizing and activating cause-effect relationships;
5. assessing the significance of analysis;
6. applying concepts in real-world scenarios;
7. evaluating the accuracy of information;
8. generalizing ideas to derive broader principles;
9. exploring and understanding alternative points of view;

10. identifying and evaluating solutions, along with alternative approaches to problem-solving;

11. clearly defining the problem within a given context or text.

These skills collectively contribute to a robust framework for critical thinking, enabling individuals to engage with information, problems, and scenarios thoughtfully and analytically.

This picture could be used for a better understanding of critical thinking skills².



3

Considering the necessity of critical thinking skills formation we have analyzed the work of some AI variants. Thus the “CoWriter” seems to be very useful, because it helps to create texts (scientific or fiction), and underlines that it is really useful for the philological departments cause it provides the ability to analyze various types of academic or fiction samples.

There is also the “Teaching AI for K12, which is a portal created by Ericsson. It contains plenty of links to the free resources that our teachers can use for learning and teaching Artificial Intelligence. It includes detailed instructions and support for the teachers.

Nowadays there are many chatbots, which help learners to upgrade their skills (“Ada”, “DeakinGenie”, etc). In the United Kingdom the chatbot “OUAnalyse”

² Billy A. Danday. Advancing Preservice Physics Teachers’ Critical Thinking through Active and Passive Microteaching Lesson Study. *International Journal of Learning, Teaching and Educational Research*. 2021. Vol. 20, № 3, P. 205-228. <https://doi.org/10.26803/ijlter.20.3.13>

³ Billy A. Danday. Advancing Preservice Physics Teachers’ Critical Thinking through Active and Passive Microteaching Lesson Study. *International Journal of Learning, Teaching and Educational Research*. 2021. Vol. 20, № 3, P. 205-228. <https://doi.org/10.26803/ijlter.20.3.13>

is very popular due to its ability to collect information about academic scores, and points. This AI helps to predict the achievements in certain disciplines. The student has the opportunity to create his/her educational vector. The absence and presence of the students are also stored by AI.

The LabXchange was implemented at Harvard University. It deals mainly with the scientific activity of the students and scholars. This platform deals with the instructions, leads the monitoring of the laboratory tests, analyses the received results, and stores them for further retrieval. Certainly, it guaranteed 24/7 access to global scientific societies and libraries.

The tool “Swift” has a set of methods, which were created and implemented by the Swift Learning Services. It reveals the hardships of the learning process, creates educational vectors and supports communication with students and scholars.

For the teachers of Music, it will be useful to implement some elements of AI with the help of SmartMusic, which can help teachers to teach and to correct their pupils. AIArtists.org is the resource that provides the ability to create AI images or pictures which could be the theme for the conversation or discussion at English language lessons.

Artificial Intelligence has become an essential part of our daily lives, which makes the system of higher education evolve along with it. There are numerous ways of implementing AI into the learning processes but we’d like to emphasize the importance of AI for the formation of the critical thinking of students during the English language lessons.

For example, it is suggested to work with AI as with the assistant for practicing pronunciation. Propose your students to ask the ChatGPT to pronounce the word, phrase, or sentence. The students have to repeat the material to master the correct pronunciation at home or in their lessons.

To upgrade their critical thinking skills propose students ask the ChatGPT to write the story on the given topic but using different words. Then the students have to compare the results, analyze them, and choose the best variant.

Also, ask AI to generate fake news. Your students have to read them. After that, the students have to find the correct arguments and prove that the news samples were fake.

The ability to form the correct question is one of the characteristics of critical thinking thus, practicing to state the tasks for the AI is a rather interesting and useful skill.

Suggest students ask AI to generate the dialogue on the given topic. After that, they have to ask AI to read it aloud. Then students have to learn it and retell it to the group, replacing the words with the correct synonyms. This will help them to mobilize their critical thinking and language skills.

Suggest your students create exercises on grammar rules using AI. After that, they have to exchange the exercises and complete them. The next task is to check the group mates' works. They have to analyze them, find the mistakes, and find a conclusion which is difficult for them considering English grammar.

Propose your students to write an article for the scientific journal with the help of AI. Let them find the wrong/uncertain abstracts and ask them to correct them or replace them with their own.

You can upgrade the vocabulary of your students offering them to ask ChatGPT to make a list of the synonyms or opposite terms. After that, the students have to mix them and create a story on the given topic. Their group mates have to become their opponents and find the arguments.

Try to discuss various topics with your students using the ChatGPT. Make your students conclude the discussion.

Ask students to communicate with the ChatGPT individually but on the same topic. Compare the results (dialogues, terms, vocabulary), make the analysis, and underline the conclusion. This could be done in real-time within distance learning which increases the effectiveness of the work with AI.

You can ask AI to create a certain image on the given topic. Ask your students to describe it in written form. After that, students have to exchange their works and analyze them, comparing stylistic devices, vocabulary, and the general sense.

Regarding inclusive education, our proposal involves incorporating the speech recognition platform, Dragon Anywhere, into the educational framework. Nuance Communications developed this platform for the creation and editing of texts with voice input which would be useful for people with special demands. Your students can create graphics, images, etc, which gives self-realization opportunities for people with certain mal-development.

We would like to propose the scheme of work that should be suggested to students with special needs within the educational processes, oriented on problem-solving as crucial critical thinking skills. It helps to structure the students' activity considering the work with AI, directed on the formation of critical thinking skills.

Problem-solving is a combination of cognitive processes that are oriented on the change of the given state to the final state. Problem-solving can be an effective educational process, which is very useful for students with special needs because they can have some problems with mastering critical thinking skills via English lessons. Remind your students that they will receive your support because all of them are smart, reflective, wonderful, curious, clever, and brainy.

Students with special needs should have much more time to overcome various barriers during problem-solving. The student's initial knowledge of the problem is the conditions (the given state) and we have to repeat or survey our students before the problem-solving tasks. Then we have to suggest operations (activities that improve critical thinking) that can be realized for the achievement of the needed result. We should pay attention to the psychological-pedagogical conditions for the educational process. Also, we should overcome certain psychological barriers because the process of overcoming the obstacles can include not only cognitive but also motivational and emotional aspects. Speak to your students, ask them to repeat the task, to tell them what is the most difficult part of the task. Remember that students with special needs need more time to solve the problem. The time needed for problem-solving is a significant point for these students, so don't make them hurry because many internal and external factors influence problem-solving.

With the help of AI, we can create the positive external factors that could be given in their diversity (images, sounds, music, videos, funny jokes).

The inner factors could be smoothed by the positive and friendly atmosphere in the classroom/auditorium. Thus it is very important to take into account those facts during the educational process where problem-solving is used because the pupils could need a different time for the resolution of the problem especially if it deals with critical thinking skills (analysis, synthesis, comparison, generalization).

The organization of work with AI at this stage may be different. It can be a story, created by AI, an individual, pair, or group reading of the English text created by AI, watching a video that was suggested by AI, discussion of the image, suggested by AI.

We have to focus on the importance of the personal acceptance and tracking of information which could be realized with the help of AI. The main task is to support the activity of students with special needs, to boost their interest. You can use our Action Checklist of the Problem-Solving via AI which could be printed for your students individually or displayed on the interactive board.

Action Checklist of the Problem-Solving via AI

	STRATEGIES	ACTION CHECKLIST
1.	Determine the problem to AI	Identify the problem and print it in for AI. Provide as many supporting details as possible because this helps AI to understand your idea. Provide some samples to AI. Reread and try to organize the material logically.
2.	Check the available solutions that AI proposed	Read all the alternatives, suggested by AI. Compare them and reread the possible solutions to the problem.
3.	Choose your solution	Choose the best solution from the AI and improve it with the help of the appropriate arguments and facts. Defend your choice of the problem's solution

CONCLUSIONS

We would like to underline the importance of AI implementation in the Ukrainian educational processes, considering the global positive experience. AI can guarantee the process of the students' adaptation, evaluate the students' achievements, create individual educational vectors, etc.

Summing up we can tell that AI can improve critical thinking along with English language learning. The authors emphasize that the improvement of lexical skills could be realized due to the creation of word lists (depending on the learners' level), the comparison of these lists; the choice of the best definitions of the term; the creation of Quizlet cards; creation of the exercises with the logical content in English, (which are corrected by the students); creation of the exercises with the gaps; generation of the texts, generation of the synonyms' and antonyms' lists, which must be compared by the students.

Besides the authors state that grammar skills could be developed with the help of AI due to the generation of samples of the grammar structure, creation of the grammar exercises with the logical content (definitions of the logical laws, concepts, inductive or deductive reasoning), creation of the tasks with the brackets (students have to open the brackets with the help of AI), checking of the peers' tasks, checking of the peers' home tasks, generation of the Socrates questions (thick and thin questions, tunnel questions, direct of non-direct questions, supporting, deceiving questions).

The authors believe that Artificial Intelligence within the education process can upgrade the teachers' effectiveness due to the realization of the simple tasks, which are oriented on dull, boring, non-creative typing such as the generation of word lists, etc. AI helps to find certain data for further analysis by the teachers and students, which helps to improve the critical thinking of the learners during the English lessons. The teachers would be able to create more interactive and personalized lessons due to the free time for

self-improvement and professional development during various courses or webinars. But, certainly, some problems could be caused by AI within the educational process. These problems should be solved by the schools', and universities' administrations considering the degree of the AI implementation, plagiarism, ethical problems, etc. In conclusion, we can state the formation of critical thinking skills via AI in English lessons should be well-balanced and correctly organized by the teachers within modern processes that take place in our digitalized society. Our further research works will be devoted to the influence of AI on the appropriate formation of the 4C (critical thinking, communication, collaboration, creativity) of the pupils and students who are too motivated to implement AI during their educational activity.

SUMMARY

Critical thinking, a cognitive skill of paramount importance, serves as a powerful tool for individuals to not only analyze information objectively but also to delve into a multitude of perspectives, fostering an environment where informed decisions can flourish based on empirical evidence rather than being swayed by emotional inclinations or predisposed biases. These skills, indispensable in various contexts, extend their influence across academic settings, professional arenas, and the intricacies of daily life, underscoring their universal relevance. The cultivation of critical thinking abilities through the integration of artificial intelligence emerges as a transformative approach, empowering individuals to hone their analytical acumen and decision-making prowess. By harnessing the capabilities of AI, individuals are better positioned to emerge as adept problem-solvers, navigating complex issues with a blend of confidence and clarity. The symbiotic relationship between critical thinking and AI amplifies the capacity of individuals to excel in addressing challenges across diverse landscapes. This synergy not only elevates their intellectual capabilities but also equips them with the resilience to confront multifaceted issues, contributing to a more agile and adaptable mindset.

As critical thinking becomes an integral part of one's cognitive toolkit, it catalyzes intellectual growth, fostering a mindset that embraces complexity and ambiguity with an eagerness to dissect and understand. In essence, the convergence of critical thinking and AI not only transforms individuals into astute decision-makers but also instills a proactive approach to problem-solving, thereby shaping a future where cognitive agility is paramount in navigating the complexities of an ever-evolving world.

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