**Developing critical thinking skills while teaching English vocabulary**

by

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**Abstract**

Critical thinking plays a vital role in language learning, especially in mastering vocabulary. It includes analyzing, evaluating, and synthesizing information, enabling learners to approach new words with curiosity and purpose. This not only improves retention but also gives meaningful application of vocabulary in different contexts. Students with strong critical thinking skills are better equipped to make independent decisions and express their ideas effectively, which is crucial for mastering a new language.

Integrating critical thinking into English as a Foreign Language teaching has proven to significantly enhance motivation and engagement. It makes students overcome challenges and prepares them for nuanced communication in a globalized world. Educators who incorporate critical thinking practices transform vocabulary learning into an active process that encourages deeper reflection and understanding.

Effective teaching methods include problem-solving activities, group discussions, and activities that develop analysis and questioning. These techniques change the focus from memorization to cognitive involvement. For example, solving real-life language problems prompts students to think critically about word usage in different contexts, while group discussions help express thoughts and give feedback. Such practices build both vocabulary and critical thinking, resulting in improved comprehension and application.

Thе research addressed two important research questions: (1) How does promoting critical thinking improve students’ vocabulary? (2) Which instructional approach is most effective in integrating critical thinking and vocabulary learning?

Research shows that combining critical thinking with vocabulary instruction produces multiple benefits. Students remember and understand words more effectively, use vocabulary in sophisticated and contextually appropriate ways, and gain confidence in their language abilities. A classroom environment that encourages critical engagement further fosters creativity and collaborative learning, where students feel supported to question and explore ideas.

Incorporating critical thinking into language instruction makes the learning process more dynamic and relevant. It gives students the skills needed to engage meaningfully with language, making them ready for real-world communication while promoting independence and confidence. Through thoughtful activities and structured discussions, educators can help learners not only master vocabulary but also become reflective and talented communicators.

***Keywords:*** critical thinking, vocabulary development, language learning, problem solving, teaching methods

**Аннотація**

Актуальність дослідження полягає в необхідності розвитку критичного мислення студентів під час навчання англійської мови, зокрема при засвоєнні лексичного матеріалу. У сучасному навчальному процесі акцент робиться не лише на накопиченні знань, а й на формуванні вміння самостійно аналізувати, оцінювати та ефективно застосовувати набуті знання. Викладання англійської мови як основного засобу міжкультурної комунікації вимагає розвитку таких когнітивних навичок, які дозволять учням не тільки запам’ятовувати нову лексику, а й використовувати її в реальних комунікативних ситуаціях.

Проблема дослідження полягає в пошуку ефективних методів, які сприяють одночасному розвитку критичного мислення та засвоєнню в учнів лексичного матеріалу. Незважаючи на те, що тема критичного мислення активно обговорюється в сучасній педагогіці, питання інтеграції цих навичок у процес вивчення іноземної мови залишається ще недостатньо вивченим. Розуміння впливу критичного мислення на процес оволодіння лексикою є важливим як для теоретичних, так і для практичних аспектів навчання англійської мови.

Мета дослідження – визначити вплив використання стратегій розвитку критичного мислення на засвоєння словникового запасу англійської мови. Мета роботи – дослідити, які методи є найбільш ефективними для інтеграції розвитку критичного мислення в процес вивчення лексики, та оцінити їх вплив на мотивацію та пізнавальну діяльність учнів.

Дослідження проводилося у одному з ліцеїв Чернігівської області у 10 класі, де навчалося 18 учнів.

Цілі дослідження включають:

1. Аналіз наукової літератури з питань розвитку критичного мислення та їх зв'язок із засвоєнням іншомовної лексики.

2. Розробка комплексу навчальних завдань, що сприяють інтеграції критичного мислення в процес вивчення англійської лексики.

3. Експериментальна перевірка ефективності запропонованих методів на практиці.

4. Оцінка змін рівня засвоєння лексичного матеріалу та розвитку критичного мислення учнів.

Методика дослідження включала як теоретичний, так і емпіричний підходи. Теоретичний аналіз був зосереджений на вивченні наукових джерел та визначенні основних принципів інтеграції критичного мислення в процес навчання британської мови. Емпірична частина дослідження проводилася у формі педагогічного експерименту з учнями старших класів, який включав виконання проблемно-орієнтованих завдань, участь у групових дискусіях, перевірку знань і вмінь до та після впровадження експериментальної методики. .

Результати дослідження показали, що використання вправ на розвиток критичного мислення у поєднанні з оволодінням словниковим запасом значно покращує розуміння, запам’ятовування та активне використання нових слів. Зокрема, студенти, які брали участь в експерименті, продемонстрували вищий рівень залучення до навчального процесу, глибше розуміли значення та контекст слів, а також більшу здатність використовувати їх у різних комунікативних ситуаціях. Вправи на аналіз, порівняння та оцінку допомогли їм не лише наповнити словниковий запас, а й розвинути вміння критично сприймати мовний матеріал.

Результати дослідження свідчать про те, що інтеграція критичного мислення у викладання англійської лексики сприяє ефективному засвоєнню мовного матеріалу та формуванню важливих когнітивних навичок, необхідних для успішного спілкування. Запропоновані підходи можна рекомендувати для широкого впровадження в практику викладання англійської мови.

***Ключові слова:*** критичне мислення, розвиток лексики, мовне навчання, вирішення проблем, методи навчання

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# Introduction

Traditional methods of teaching English, especially vocabulary acquisition, have often relied on rote memorization and word repetition. While such approaches may be useful for initial acquisition of the material, they often leave learners with little opportunity to develop a deeper understanding of the language and effectively apply it in practice. Modern educational concepts emphasize the importance of integrating higher-order skills, such as critical thinking (СТ), into the learning process. This approach has a dual goal: improving language skills and developing cognitive abilities that allow students to analyze, evaluate, and use language creatively in different contexts. The main thesis of this work is that integrating critical thinking skills into the process of learning English vocabulary significantly improves both language acquisition and cognitive development of students. This approach allows you to move away from mechanical word learning and focus on deep language learning, improving understanding, memorization, and the ability to use vocabulary in appropriate contexts.

CT allows for a deeper perception of language, as it includes analyzing information, assessing its reliability, and forming meaningful conclusions based on it. The inclusion of such cognitive processes as problem solving, decision-making, and logical reasoning makes vocabulary learning not just a technical skill, but a process that contributes to the formation of a wide range of intellectual competencies.

This study is relevant for the field of language learning, pedagogy, and cognitive psychology, especially in the context of learning English as a foreign language. In modern approaches to language learning, more and more attention is paid to the development of not only linguistic, but also cognitive skills, which are necessary for successful adaptation in the conditions of globalization and the information society.

Mastering vocabulary is an integral part of the language learning process, since it is words that are the basis for building the performance of verbal structures and effective communication. However, students who expand their vocabulary without the ability to critically comprehend it often encounter difficulties when using words in context. It confirms the need to find approaches that not only help to remember words, but also provide an opportunity to actively interact with them.

The integration of critical thinking skills into the language learning process allows learners to develop a deeper understanding of the meanings of words, their connotations and content in different contexts. For example, tasks that involve analyzing meanings, searching for associations, or using words in creative situations allow participants to go beyond mechanical memorization and master language as a tool for developing complex ideas.

In addition, combining vocabulary learning with the development of critical thinking meets broader educational goals. In the 21st century, creativity, collaboration, and effective communication are key skills. These competencies play an important role in professional activities, academic achievements, and intercultural communication.

The practical significance of this work lies in the possibility of applying its conclusions to develop effective methods of teaching English. Tasks that include elements of critical analysis, discussion, and problem solving make the learning process more dynamic and motivating for learners. In addition, such approaches help prepare them for real-world challenges associated with using language in professional and everyday life.

Thus, the study shows that integrating critical thinking into the English language learning process opens up new perspectives for both learners and teachers, making language learning more profound, meaningful, and effective.

# Literature review

Nowadays, in a world full of diverse information critical thinking skills are needed more than ever. Critical thinking is implemented in studying process as its use contributes to solution of complex problems, encourages learners to make informed decisions and analyze various statements. The integration of critical thinking into vocabulary teaching methodology causes a big attention and interest among a significant amount of linguists and English teachers.

In the current literature, the concept of CT is seen from different points and described in multiple ways (Davies, 2015). Despite the differences in definitions, the importance of CT is considered to be significant. Davies consolidates important dispositions identified by leading researchers. He states that, despite their relation, CT skills are highly varied: they include judging or evaluating arguments; making decisions or solving problems; predicting; inferring; reasoning verbally; recognizing assumptions; interpreting and explaining; defining concepts; asking for clarification. Concerning the dispositions, Davies points out that they respect different points of view: a sense of openness, curiosity, fairness, a desire to be well-informed, caution, skepticism, intellectual courage, empathy, honesty, persistence, appreciation of individual differences.

According to Atabaki Keshtiaray (2015), developing critical thinking can help learners in future to communicate with others, assess and solve social problems, make conclusions basing on their personal evaluations.

Zhou, Jiang and Yao (2015) claim that critical thinking is a weighty skill that helps people to criticize, evalute diferent points of view and reflect on them. Despite the fact that critical thinking is established as one of the greatest skills, it is rarely provided in English language teaching. Teachers mostly pay attention on the explanation of new word without giving a context of it.

Luk and Lin (2015) consider CT is observed through writing and speaking language only, so learners may be at a disadvantage because they me be culturally predisposed to refrain from vocal criticism. In developing CT it is essential to understand a cultural identity of each learner.

Bloom's Taxonomy (1956) divides CT into lower-order (knowledge, comprehension, application) and higher-order skills (analyzis, evaluation). Teachers have to put up questions addressing these both levels of thinking, if they want to stimulate CT. Bloom's Taxonomy offered a well-structured framework to establish learning objectives, develop curriculum, and evaluate students' perfomance. By organizing cognitive skills into distinct levels, it aimed to enhance clarity and focus in teaching practices, involving students into deeper learning with the use of CT skills.

Wilson (2010) explains that CT helps learners rethink their identities, by allowing them to engage with or challenge dominant ideas rather than avoiding them out of fear or insecurity. Without these skills learners may have problems in interaction with classmates and it will negatively affect their progress. After introducing CT, learners can become valuable members of any community by using their language skills, culture, experience to make impactful contribution in every kind of task. He also suggests four strategies for developing CT while language learning: making a supportive community, a work with critical texts, discussion tasks, critically-oriented writing task. By exchanging thoughts, ideas and taking part in critical discussion, students learn from each other and develop their mental and analytical skills, especially when they have to express themselves in English. Wilson states that this approach helps learners to realize their unique voice by sharing personal experiences and perspectives. Such activities not only stimulate deep thinking but also make learners to invest intelectually and emotionally.

Previous researches showed the necessity of developing CT. Akpur (2020) detected the connection between critical thinking, reflexive thinking, creative thinking and noted their impact on learners' perfomance. The connection between the level of CT development and academic success was previously discovered by Fong, et al. (2017).

Phuong Anh (2016) defines four pivotal steps to improve CT in English lessons: precise obtainig of the information, analyzing issues objectively, asking questions, formulating communicative decisions. Real critical thinkers are usually curious and eager to get well-checked and proved facts, so it is essential to answer questions. The more information students gather, the more rich and reliable points of view they can use in their answers. Thorough analysis of the sources, statements, and ideas can be challenging but it prepares learners to make valuable conclusions and elicit the essence from any information. Practicing the communicative skills while making decisions accustoms learners to work among different types of people.

Research by Steffen (2011), Choorapanthiyil (2007), and Odenwald (2010) denote the importance of creating a learning environment that encourages classroom discussion, fostering students’ enthusiasm for learning, and connecting the material to their real-life experiences. Odenwald (2010) further emphasizes the value of allowing each student to feel comfortable expressing their opinions and engaging in discussions about meaning, as this encourages “broader intellectual enrichment.”

Barcelos (2013) states that during the lesson, teachers must consider not only the subject matter but also the way the students learn. Thus, the role of learner-centered classroom is considered to be important. The teacher should provide the program that involves not just note-taking and memorizing but also develops thinking skills and creates opportunities for problem-solving. If students are aware of autonomous learning, they can reach a success in language learning.

Paribakht (2006) claims that the initial stage of learning vocabulary is guessing or inference. Students need to correctly understand the meaning of a word in order to use it properly later. If students connect a word to the wrong meaning, it not only impedes their process of remembering the word but also causes confusion or mistake in the future. It makes inferencing a key step in learning vocabulary indirectly. In simple terms, inferencing includes making a guess about the meaning of an unfamiliar word based on the context it appears in.

Beck, McKeown and Kucan (2013) propose robust vocabulary instruction that encourages learners to think deeply about word meanings, relationships, and usage. For instance, teachers can integrate activities that require learners to compare synonyms, analyze word connotations, or apply new vocabulary in critical discussions. Farahanynia and Nassiri (2016) further investigate the link between CT skills and lexical knowledge, finding that learners with advanced CT abilities demonstrated superior vocabulary performance.

Hughes (2016) examined the utility of contextual approach in teaching and learning. This concept revealed to be useful because it provides the materials consisting real-world problems or situations. This approach makes it feasible for students to apply the acquired knowledge outside the classroom. The teacher's task is to focus more on creating strategy which will help students to go beyond the usual framework of thinking. Thus, the learning outcome is secondary to the strategy. The teacher must lead students to a certain mindset that will help them analyze certain phenomena from a different angle and come to the conclusion.

Effective assessment of vocabulary understanding is critical for fostering critical thinking skills in English language learners. This process not only improves students' perception of lexical items but also enhances their ability to engage with complex texts and concepts. For instance, implementing strategies such as Project-Based Learning (PBL) enables students to apply vocabulary in meaningful contexts, reinforcing comprehension through collaboration and peer feedback (Wang, 2019).

Martinez (2022) insists on the importance of going beyond rote learning and using familiar cases that students can relate to. The emphasis should be made on more purposeful goal-oriented learning. A key aspect of the curriculum design should ensure emotional connection and active involvement with the material. Linking the lerning process to students' real-life experience, the curriculum can foster more meaningful and effective academic growth.

Concerning CT and vocabulary instruction several researches highlighted an importance of CT in vocabulary learning and lexical influence. Sharafi-Nejad et al. (2016) expressed an interest in investigating these two notions. Faramarzi, Elekaei and Heidari Tabrizi (2016) also found that students with high CT skills had superior lexical knowledge. Mirzai (2008) also investigated the relationship between students’ CT ability and lexical inference (as a CT skill) and found that students with high CT abilities were better at lexical inference compared to those with low CT abilities. Similarly, Farahanynia and Nasiri (2016), who investigated the relationship between CT and lexical inference among 68 intermediate EFL students, showed that the group with higher CT skills performed better in lexical inference. Zarei and Haghgoo (2012), on the other hand, concluded after conducting a study of 150 students that the relationship between CT and students’ vocabulary knowledge was not significant.

Many studies have examined various teaching methods to develop CT skills, but there is growing emphasis on understanding teachers' views, beliefs and professional development requirements in this area. Roomy (2022) analyzed educators' perspectives on integrating CT into higher education. The study found that teachers value CT as a vital skill to navigate the complexities of professional life. Educators believe CT can be effectively taught if active methodology is supplemented, institutional disinterest is addressed, and students bring the initial level of CT from earlier educational stages.

Similarly, Suh (2023) conducted a comparative analysis paying attention on English-language learners with low state math achievement scores, pointing out the role of CT in diverse learning contexts. Aimah (2020) conducted a study focusing on pre-service English teachers and their pedagogical content knowledge, specifically connected with the integration of CT skills into foreign language instruction. This research examined the perspectives of both novice and experienced teachers. Using a self-made questionnaire, the study measured teachers' beliefs and revealed that teaching experience and participation in teacher education programs significantly influenced these beliefs. The findings showcased the varying perceptions between novice and experienced educators, emphasizing the role of professional development in forming attitudes toward CT.

The reviewed literature underlines the interest in the topic of critical thinking by most linguists, educators, and other authors who are related to English language teaching. However, the examination of different literary sources showed that there is a lack of more specific CT implementation in studying process, namely through the vocabulary instructions. Still, a space for exploring the impact of vocabulary instructions on CT remains and this topic has to be studied on a more detailed level.

The following key questions were raised as part of the study:

* How does the integration of critical thinking affect the process of acquiring and using English vocabulary?
* What pedagogical approaches are most effective for the simultaneous development of critical thinking and vocabulary learning?

# Methodology and procedure

Pedagogical research is a process aimed at studying and enhancing educational practices in controlled conditions. By integrating a mixed-method approach this study provides valuable conclusions about the role of problem-solving, reflective learning, and contextual application of vocabulary in the formation of students' language.

The study was conducted with eighteen students, aged 15–16, from a tenth-grade class. The average age was sixteen, and students attended English classes three times a week. At this stage of adolescence students are in a transitional phase characterized by increasing emotional, cognitive and social development. These students demonstrate both enthusiasm and misgiving because they can be eager to take part in challenging tasks while being hesitant to take risks for fear of making mistake. According to previous assessments and teacher reports, most students had a B1 (intermediate) level of English proficiency. The participants demonstrated a lot of interests, but they shared a strong focus on improving their language skills, especially in vocabulary acquisition, to enhance their communication skills for both academic and personal purposes.

The first stage of my pedagogical research was preparatory. It involved a planning of further researching actions. During this stage school curriculum of 10th-grade students was thoroughly analyzed. The work in class was also observed and analyzed. Besides, relevant literature was reviewed in order to know guiding principles in applying CT tasks. An action plan included selecting appropriate methods and materials to develop vocabulary skills through critical thinking. Activities were designed to focus on analysis, synthesis, and application. The research lasted 10 weeks and involved questionnaire (Appendix A), pre-intervention and post-intervention tests (Appendices B, G), classroom activities (Appendices B, C), and reflective task (Appendix E).

The second stage was about obtaining the data about learners' decision-making, problem-solving skills and the way they are thinking while doing the tasks or sharing the ideas. The questionnaire was designed to identify not only learners' comprehension of context and their thinking strategies but also the way the vocabulary was acquired in English classes. After conveying a survey it was mentioned that there is a strong need to implement more tasks which require a correct understanding of context and clear formulation of statements in their vocabulary learning process. Pre-intervention was conducted next in order to measure the initial students' knowledge and level of their mindset.

The next stage was introduction of CT activities. At this stage several activities were implemented and they were aimed at:

* identifying specific contexts, where appropriate words and expressions were to be used;
* discuss real-world problem;
* generate ideas and solutions for problem;
* evaluate both opportunities and risks of a certin phenomenon;
* make the predictions basing on learners' personal conclusions;
* develop opposing argumentation.

The following sample activities were implemented in the lessons:

*Sample activity 1*

*Topic:* Environmental Issues

*Objective:* Use CT to analyze an environmental problem using the given vocabulary.

*Materials:* a list of vocabulary

*Instruction:* Imagine that you are a part of scientific group and your task is to reduce a negative impact of your city on the environment. You are to create an action plan that touches the following key problems: deforestation, pollution, overpopulation.

*Sample activity 2*

*Topic:* Environmental issues

*Objective:* Help students identify and appropriately use vocabulary related to topic by analyzing specific scenarios and identify how the terms adress the context.

*Materials:* a worksheet with scenarios describing environmental changes; a list of vocabulary: climate change, biodiversity, pollution, habitat loss, ecosystem, renewable energy, deforestation, recycling, ecological footprint, sustainability.

*Instruction:* Read the cases about environmental changes and match them with contextually suitable words. Explain your choice and share your ideas with classmates. In groups, discuss whether you agree with each others' ideas.

Reflective task was introduced to give students a chance to reflect on the results and effectiveness of their work. Students were asked to write a short paragraph summarizing what they has learned and what is their atitude to a certain phenomena or issue. At the end of each lesson, students were also asked to sum up what they learned, how they approached the tasks, in how they can apply new vocabulary. These reflections contributed to students' awareness of their progress.

Each activity was selected basing on the students' level of English proficiency and the types of tasks they were used to work with. Before doing the tasks students were provided with information related to the topic. It was presented in the following forms: presentation, video and audio recordings, articles. Different educational platforms, web-sites like BBC and YouTube were used to introduce new material in a more interesting way without a superficial presentation of it with subsequent memorization by students. All these materials were thoroughly checked and approved by English teacher.

Each lesson was organized so that the topics, objectives, studying curriculu aligned with the developed tasks.

In the final stage, post-intervention test was conducted, which summed up the experience and consolidated the acquired skills among the students. This phase was administered not only for asessment of students' progress but also to find out the the impact of methodologies and tasks during the intervention. It also provided new perspectives to focus on in further researches of topic.

**Effectiveness of Research Tools**

The data collection process had several stages and involved quantitative and qualitive methods to show a complete picture of the effectiveness of implementation CT tasks in English lessons. At the initial stage of study the questionnaire helped us to determine learners' attitude towards learning a vocabulary and to reveal learners' mental inclination. This questionnaire was developed according to key principles and questions, partially taken from works of the authors mentioned in the analysis of literary sources. They contained statements related to aspects of checking facts, analysis of the information, collaborative work, etc. Students rated how well each statement corresponded to their habits and experience acquired during the previous English classes.

One more pivotal tool was pre- and post-intervention testing. The pre-test defined the initial level of critical thinking. The test included analysis of problems and cases, evaluating the reliability of information, argumentation of position, and use vocabulary adequately in context. After 8 weeks of training, during which CT activities were used, a post-intervention test was conducted. This test allowed us to compare the results and measure the progress of students' work.

Additionally, observations of students' work were made in the classroom. They helped to pay attention on their participation in discussions, ability to argue their opinions, and the accuracy of vocabulary use. Special focus was made on how students' completed the group tasks and whether they were able to share their own ideas and find compromises. The activities played a considerable role during the practical stage as they offered different ways of working with information and encouraged learners to interesting interaction. The suitability of created tasks for studying process was thoroughly checked and approved by English teacher. It was necessary that all the activities met educational standards and goals.

Before conducting the study, potential obstacles, limitations and ethical considerations were taken into account. One of the main challenges was to choose tasks that were appropriate to the students’ English proficiency level (B1–B2) while at the same time promoting the development of critical thinking. Topics such as environmental issues and artificial intelligence were carefully selected to be interesting, actual and accessible. Additional explanations were provided. Among the practical constraints, the time frame should be noted, as the tasks had to fit into the allotted lesson time, maintaining a balance between vocabulary learning and the development of critical thinking. Sometimes, students were shy to express their thoughts. To overcome it, supportive and calm atmosphere was created. There was also the possibility of technical difficulties when using multimedia materials. Back-up printed materials and worksheets were prepared to avoid delays.

 Comparing the results of the questionnaire, tests and observations allowed for a comprehensive assessment of the impact of the tasks. Such approach ensured the depth of the collected data and contributed to the formulation of recommendations for further exploration of the educational process.

**Ethical issues**

The study followed ethical guidelines to ensure participants' rights confidentiality and overall well-being. All students, parents, and school administrators were informed about the study's goals, procedures, and data collection methods. Informed consent was obtained from participants. Throughout the study, open and clear communication about the aims, methods, predictions was maintained. To save privacy, students' identities were made anonymous in the reports. Students were informed that participation was voluntary and they could refuse to participate. The research process contained a clear communication about the aims and methods during the study.

# Results

The research conducted a thorough examination of the results obtained with the help of data collection methods. This section presents the interpretation of the findings at each stage of the implementation process.

Before the pre-intervention test students were given a questionnaire (Appendicx A) to identify their level of thinking and ability to make decisions and solve problems. It was determined that most students have moderate levels of engagement and critical thinking. Specifically, 10 out of 18 students reported that they sometimes consider the consequences of their actions and review sources before completing a task, while a smaller group of 5 students indicated that they often consider the sequences of their actions and try to use various resources. Despite this, most students (13 out of 18) indicated that they collaborated with classmates to generate ideas, although this collaboration is not always effective. A significant proportion of students (9 out of 18) do not always actively check information, and only a few (4 students) regularly check the accuracy of their knowledge before moving forward with tasks. Feedback from classmates and teachers is important for 10 students but is not always used to improve their work. Furthermore, although brainstorming is useful for generating ideas for many students (12 out of 18), only 7 students organize their ideas in a structured and prioritized manner. Regarding reflection on their own learning, about half of the students (9 out of 18) admitted that they rarely engage in self-reflection, and 5 students noted that they are not very confident in their ability to formulate their own opinions in English. At the same time, most students (14 out of 18) are happy to use examples to understand new vocabulary. Still, only a few (6 students) regularly challenge themselves to explain the meaning of words independently. Although students demonstrated some effort in working in groups and participating in learning activities, their decision-making and problem-solving skills in English lessons could be further improved to promote greater independence, critical thinking and deeper engagement with the material.

The results of the pre-intervention test were divided into low, general and high levels of critical thinking. The low level constitutes to 17% (3 out of 18 students), the general level represents 72% (13 out of 18 students), and the high level makes up 11% (2 out of 18 students).

**Table 1.**

*Pre-test results*

|  |  |  |  |
| --- | --- | --- | --- |
| Question | a | b | c |
| 1 | 6 | 8 | 4 |
| 2 | 3 | 7 | 8 |
| 3 | 4 | 10 | 4 |
| 4 | 5 | 8 | 5 |
| 5 | 3 | 7 | 8 |
| 6 | 12 | 3 | 3 |
| 7 | 4 | 10 | 4 |
| 8 | 5 | 9 | 4 |
| 9 | 10 | 5 | 3 |
| 10 | 3 | 10 | 5 |
| 11 | 4 | 10 | 4 |
| 12 | 5 | 8 | 5 |
| 13 | 3 | 9 | 6 |
| 14 | 7 | 5 | 6 |
| 15 | 6 | 5 | 7 |

Post-intervention test showed that the high level increased by 39%, the low level decrease significantly by 11%, showing an almost complete reduction of students with minimal skills. The general level decreased by 28% because many students moved into high-level category.

**Table 2.**

*Post-test results*

|  |  |  |  |
| --- | --- | --- | --- |
| Question | a | b | c |
| 1 | 2 | 14 | 2 |
| 2 | 1 | 12 | 5 |
| 3 | 1 | 15 | 2 |
| 4 | 0 | 13 | 5 |
| 5 | 0 | 11 | 7 |
| 6 | 16 | 2 | 0 |
| 7 | 1 | 16 | 1 |
| 8 | 0 | 15 | 3 |
| 9 | 15 | 3 | 0 |
| 10 | 0 | 17 | 1 |
| 11 | 0 | 13 | 5 |
| 12 | 0 | 14 | 4 |
| 13 | 1 | 14 | 3 |
| 14 | 0 | 13 | 5 |
| 15 | 0 | 12 | 6 |

The findings of the pre-intervention testing revealed that most students had difficulty in thinking critically when working with vocabulary and concepts related to environmental and technological issues. Most students demonstrated a low ability to identify key issues, analyze causes and effects, and propose solutions. They often used only simple words, avoiding more complex or specialized terms. Their ability to formulate arguments logically or justify their opinions was also limited. Collaboration and group discussions were passive, with only a few students actively participating or suggesting meaningful ideas. Students had serious difficulties in identifying key issues, analyzing cause-and-effect relationships, formulating solutions. Their answers were often superficial, and their use of vocabulary was limited to the simplest terms. There was uncertainty in constructing arguments and supporting their own opinions.

The results of post-intervention testing pointed to significant improvements in all aspects assessed. Students who previously had difficulty completing tasks that involved the application of CT skills showed enhanced confidence and willingness to analyze problems, ponder on possible consequences, propose clearly formulated solutions and justify their opinions. After the intervention and post-test it was noticed that their responses became more structured and filled with topic vocabulary. They used such terms as ''plastic waste,'' ''ecological footprint,'' ''ecosystem disruption,'' clearly describing the main problem and its consequences for nature.

One of the most noticeable outcomes was the expansion of students' vocabulary and the confident use of it. While they used simple and familiar words like ''dirt'' or ''heat'' before the intervention, after the the testing they were willing to use more complex forms. Students began to build well-structured sentences with new words where pauses and hesitations were reduced due to better mastery of new terms. For example: ''The widespread use of technology can contribute to sustainable development, but there is a risk of addiction to digital tools and the loss of concentration on studying among the young people.''

One more intersting finding was students' ability to make original arguments. Before the intervention, their reasoning was straight-forward and lacked the necessary examples or evidences to support and prove the opinion. After the intervention students touched on different perspectives, presented facts, weighed positive and negative sides consequences of each problem. For example. During the discussion of technological advantages, students were able to balance the positive aspects of AI in studying process and concerns about its dangerous affect on data privacy.

The group tasks fostered a sense of responsibility and stimulated mutual support among students. The tasks which required the creation of action plans or gathering the necessary information for supporting the ideas made students to rely on each others' feedback and confirmation.

The interaction became more dynamic during group tasks, with active discussions and shared evaluation of proposed solutions. Students began to take an active part in discussions, debates and find compromises. They also learned to provide the explanation for different strategies, divide their actions into logical steps, argue their choices and find the most appropriate solution. For example: ''We decided that the first step should be the introduction of plastic waste recycling program. It will help to reduce river pollution and improve the conditions of nature. The next step should be the popularization of environmentally friendly products among the population.'' The change of classroom dynamics not only improved group cohesion but also increased individual confidence. It was discovered that that students were learning from each-others' ideas, which enhanced their understanding and enriched their methods of solving the problems.

It is also important to keep in mind that each student has personal preferences, weaknesses and strengths, cultural background, level of confidence. These factors should be taken into account during each testing as they allow to choose a survey format that is favorable to everyone and can give objective results. Future introductions of tasks should explore differentiated instruction offering various levels of complexity challenging students with advanced level of English and supporting students who need additional help and guidance.

Comparing the results before and after intervention indicates considerable progress in developing critical thinking skills, vocabulary use and engagement during learning. Progress is summarized in Table 3:

**Table 3**

*Summarized progress*

|  |  |  |  |
| --- | --- | --- | --- |
| **Skill assessed** | **Pre-intervention** | **Post-intervention** | **Progress** |
| Identification of problem | Limited and simplified, low use of topic-specific vocabulary | More detailed and accurate | Improvement in clarity and precision |
| Analysis of causes and effects | Superficial reasoning, weak links between causes and effects | Stronger arguments with a logical connection of ideas | Enhancement of critical analysis |
| Vocabulary usage | Basic, avoided complex and unfamiliar terms | Confident use of topic-oriented and advanced vocabulary | Increased vocabulary range usage accuracy. |
| Collaboration and discussion | Passive participation, minimal interaction | Active engagement, frequent exchange of ideas | Better intersection and teamwork |

Finally, the results confirm that the integration of CT tasks into the process of learning English vocabulary had a positive impact on the development of students' analytical skills, their ability to reason and use thematic words in context. Students became more confident in their decisions, and their speech became more accurate and logical. Moreover, group work and discussion contributed to increased activity and cooperation in the classroom, which allows to speak about the complex impact of the proposed tasks on the learning process.

# Discussion

The results of this study prove the effectiveness of integrating CT tasks into vocabulary teaching. A critical analysis of the findings, as well as comparison with the existing literature, points out possible benefits and difficulties of implementing critical thinking in language learning.

The integration of CT into vocabulary instruction was based on an emphasis on using words meaningfully in suitable contexts. Before the intervention, students' vocabulary use was mainly limited to memorization, without the readiness to apply it outside the classroom or according to their topic. After the intervention, they made the achievements in these areas judginh by their work. This is consistent with the statements of Atabaki and Keshtyari (2015), who argue that developing critical thinking helps students to communicate effectively, evaluate social issues and make personal judgments.

The relationship between CT and academic achievement, investigated by Akpour (2020), are strongly connected with the results of this study because students improved their vocabulary knowledge and comprehension using it in writing, speaking and in various performances.

Bloom's Taxonomy (1956) was also used as a profitable framework. The intervention covered both lower-level skills (knowledge, understanding, application) and higher-level skills (analysis, evaluation). This balanced approach is consistent with Bloom's recommendations to promote CT through a combination of questions and task design.

The study’s accent on context-based vocabulary tasks is consistent with Hughes’ (2016) findings that points out the importance of using real-world scenarios to deepen students’ language understanding. By applying new vocabulary to tasks such as solving environmental problems or analyzing the role of artificial intelligence in education, students move beyond rote memorization and learn to evaluate, interpret, and use words dynamically. This approach, confirmed by Beck, McKeown, and Kucan (2013), fosters critical engagement and ensures that vocabulary is retained and used effectively in a variety of contexts.

The results also support the connection between CT and vocabulary knowledge demonstrated by researchers such as Mirzai (2008) and Farakhaniniya and Nassiri (2016). The study found that students with improved CT skills had better vocabulary recall and use, mirroring the findings of these researchers. Moreover, the results showed that logical inference, which Paribakht (2006) identified as a main step in vocabulary acquisition, was effectively developed through CT tasks, allowing students to more accurately infer the meaning of words from context.

Answering the first research question 'How does promoting critical thinking improve students’ vocabulary?' it is possible to state that several aspects of students' language acquisition were defined:

* *Deeper understanding of words*. Students learnt to understand the meaning, context, connotations of new vocabulary. For example, exercises demanding to categorize terms like ''pollution'' or ''sustainability'' by their relevance to environmental problems helped them to understand not just definitions but also their usage in real-world cases.
* *Impact*. Students showed the retention and contextual application of vocabulary because they could connect terms with different themes.
* *Problem-solving application*. CT tasks, such as creating action plans to reduce ecological footprints, contributed to making proposals, discussions, and reflective writing. It shifted students' focus from memorizing words to active using them in interactive problem-solving situation.
* *Motivation*. Activities like predictive thinking (forecasting the impact of AI in education) pointed that CT stimulates curiosity and encouragement. As students used vocabulary to weigh opportunities and risks, they felt a stronger connection between learning and practical outcomes.

 According to the second research question 'Which instructional approach is most effective in integrating critical thinking and vocabulary learning?' it was revealed that a combination of instructional methods was most effective:

* *Problem-based learning*. Tasks aimed at encouraging students to work in groups or pairs where they had to sort out real-world problems and solve them. For example, identifying problems like deforestation or pollution made them to express ideas using target vocabulary.
* *Context recognition*. Matching terms to scenarios ( associating climate change with rising temperatures) helped students practice contextualized learning.
* *Reflective task*. Writing reflection on the covered topic or work allowed students to use newly learned terms while evaluating the appropriateness of their ideas. Such practise also influenced their metacognitive awareness.
* *Collaborative discussions*. Group discussions where students defended solutions or listened to peers' points of view and suggestions (prioritizing solutions to pollution) proved to be essential.

The findings of this study also suggests the following recommendations for educators and language instructors:

1. Introduce CT gradually. Since students initially found critical thinking tasks challenging, a gradual introduction of these activities may help ease students into more analytical vocabulary learning. Starting with simpler activities, such as basic matching with justification, and gradually progressing to paragraph writing could help build confidence and skills over time.

2. Incorporate contextualized learning tasks regularly. Tasks that require students to apply vocabulary in real-world contexts, such as writing paragraphs or discussing environmental issues, proved effective in enhancing vocabulary retention and critical thinking skills. Regular use of such activities in the classroom could foster greater language proficiency and make vocabulary learning more meaningful.

3. Stimulate reflective Learning. Activities that ask students to justify word choices encourage reflection and a deeper understanding of vocabulary. Instructors could consider implementing self-reflective tasks in which students assess their understanding of vocabulary, discuss their reasoning with peers, or write brief reflections on vocabulary usage.

4. Use collaborative learning activities. While this study focused on individual performance, collaborative activities could be beneficial for vocabulary learning as well. Group tasks, such as discussions or collaborative writing, would allow students to learn from each other’s perspectives and gain confidence in using vocabulary in a social context.

While this study shows promising results, additional research could provide further insights into the effectiveness of combining critical thinking and vocabulary instruction:

1. Long-term effects of critical thinking on vocabulary retention. This study was conducted over a relatively short period. Future studies should examine whether the gains observed in vocabulary retention and usage persist over time and how long-term exposure to critical thinking activities affects vocabulary knowledge.

2. Differentiating critical thinking tasks. Further research could explore the impact of different types of critical thinking tasks (e.g., analysis, synthesis, evaluation) on vocabulary learning. Such research could help identify which activities are most effective for vocabulary acquisition and which best foster critical thinking skills.

Integrating CT into a language curriculum requires careful planning and coordination with the next educational goals. The curriculum should be learner-centered and encouraging students to active work. Authentic assessments, including perfomance-based tasks and portfolios can help students to practice CT skills in real world. Portfolios can help to collect student work over a time and by tracking the learning process and reflecting on it. Reflective journals may also be used as a good method for assessment because they make it possible for students to reflect on the acquired skills and make conclusions about the developing of their thinking skills.

The findings and observations of the study make it clear that students improved their language learning skills. Key instructional strategies like contextualized tasks, collaborative discussions, problem-based learning proved their effectiveness during the vocabulary practicing. Further researches should be done in order to identify all advantages and disadvantages of mentioned approaches, and measure their long-term impact on CT development.

# Conclusion

The research on integrating critical thinking tasks into vocabulary learning for 10th-grade students offers useful insights into effective teaching methods. By focusing on real-life situations, the study showed how carefully planned activities can improve both language skills and thinking abilities. The findings not only answered the research questions but also contributed to broader educational strategies aimed at developing critical thinking and language learning at the same time.

A major result of the research was that students were able to learn vocabulary more effectively through critical thinking activities. For example, tasks that made students analyze environmental issues, like deforestation and pollution, demonstrated how learning in context helps with remembering words. This approach helped students see words as tools to express ideas and solve real-world problems, not just as isolated terms.

Students also gained more confidence in using new vocabulary. Group discussions, where they had to defend ideas or evaluate others' opinions, gave them the opportunity to practice words like "biodiversity," "sustainability," and "innovation." These activities not only helped with language skills but also taught important life skills such as teamwork and argumentation.

Reflective writing exercises allowed students to think about their learning process. Writing about topics like the role of artificial intelligence (AI) in education helped them connect vocabulary to real-life situations, making the learning more relevant and interesting. These reflective practices emphasized the importance of thinking about their own learning in vocabulary development.

Including critical thinking tasks was not just helpful for vocabulary learning but also changed the way students approached learning. By adding critical thinking into lessons, the study aligned with modern educational goals, such as problem-solving, creativity, and adaptability.

For example, predicting future technological developments through AI discussions helped students think critically about potential advancements. These activities showed how vocabulary tasks could encourage ethical thinking and focus on the future. Similarly, environmental problem-solving tasks taught students to prioritize sustainable practices while using terms like "ecological footprint" and "habitat loss."

The success of this approach came from its variety. Combining problem-solving tasks, vocabulary activities, and reflective writing provided a well-rounded learning experience. Observational data showed that students became more involved and analytical, engaging with both the tasks and vocabulary. Pre- and post-tests confirmed the effectiveness of the approach, showing improvements in both critical thinking and language skills.

The inclusion of questionnaires helped assess not only students’ progress but also their attitudes toward the learning process, providing feedback for future research.

However, there were some limitations. The small sample size made it hard to generalize the results, and the 10-week duration was not enough to evaluate long-term effects. A longer study with more students could provide more detailed results.

Another area for improvement is using digital tools for critical thinking and vocabulary learning. For example, using virtual simulations apps could make the learning process more engaging and dynamic. Platforms like Quizlet could help students interact with vocabulary in creative ways.

Expanding the range of vocabulary topics could also help students develop a broader language skill set. While this study focused on environmental and technological topics, future research could include subjects like cultural diversity or global health. This would not only increase students’ vocabulary but also expose them to new ideas, further enhancing their critical thinking.

In conclusion, this study offers valuable insights into language education, highlighting effective ways to improve both language skills and critical thinking. By tackling real-world issues, encouraging teamwork, and promoting reflective practices, the research provides a solid framework for future teaching methods. While challenges like study size and duration remain, the positive results show that critical thinking can play a very important role in vocabulary learning.

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# Appendices

**Appendix A**

 Questionnaire to identify students' level of thinking and ability to make decisions and solve problems

Please complete the following questionnaire which is directed to gather the information about learners' decision-making, problem-solving skills and the way you are thinking while doing the tasks. This survey is anonymous and you may refuse to participate in it.

Read the following statements and rate on a scale from 1 to 5 to what extent the given statement applies to you and your classrooom activity. Pick a column that passes you with '✓'.

Gender: \_\_\_\_\_\_\_

Age: \_\_\_\_\_\_\_

Do you like learning English? Why(yes/no) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Statements | 1 | 2 | 3 | 4 | 5 |
| I weigh possible consequences before acting. |  |  |  |  |  |
| I usually review different sources for obtaining the necessary information. |  |  |  |  |  |
| When I have a task, I have to cooperate with other people to gather ideas. |  |  |  |  |  |
| I always check the accuracy of any information. |  |  |  |  |  |
| I consider feedback from my classmates or teacher after completing the task. |  |  |  |  |  |
| When facing a problem, I identify methods to solve it. |  |  |  |  |  |
| I am capable of giving reasons for my opinion. |  |  |  |  |  |
| Brainstorming helps me to express the ideas better. |  |  |  |  |  |
| I organize my ideas in order of their importance |  |  |  |  |  |
| I ask a question to clarify the meaning of the word or concept. |  |  |  |  |  |
| I listen to different points of view even If I don't share them. |  |  |  |  |  |
| I am sure I can formulate my personal opinion in English classes. |  |  |  |  |  |
| I think about how a new word can be used in other situations. |  |  |  |  |  |
| I use examples to help me understand to help me understand how to use new words. |  |  |  |  |  |
| I challenge myself to explain the meaning of the word myself. |  |  |  |  |  |
| During English classes we often work together to think through problems, issues, questions. |  |  |  |  |  |
| During English classes we are free to represent complex ideas. |  |  |  |  |  |
| During English classes we share ideas or solve different problems. |  |  |  |  |  |
| During English classes it is compulsory to explain each answer. |  |  |  |  |  |
| During English classes we sometimes reflect on our own learning. |  |  |  |  |  |

**Appendix B**

Pre-test on critical thinking

**1.Your school is deciding whether to install solar panels to save energy. Some people support the idea because it will reduce costs, while others argue it is too expensive to install. What should the school do?**

a) Install the panels to save money in the long run.

b) Avoid the cost and continue using traditional energy sources.

c) Install the panels but look for financial support such as government grants.

**2. You have a group project, and one team member is not contributing. How would you handle the situation?**

a) Inform the teacher immediately.

b) Talk to the team member and suggest ways to share tasks.

c) Take over their responsibilities to complete the project faster.

**3. A local park is being converted into a parking lot. How should the community respond?**

a) Allow the parking lot to be built to support local businesses.

b) Protest to protect the park for recreation and wildlife.

c) Suggest building a parking lot in a less-used area to preserve the park.

**4. Your school wants to replace paper books with digital tablets. Some students lack access to technology at home. What should the school do?**

a) Provide digital tablets and offer training sessions for all students.

b) Keep using paper books to ensure equality.

c) Use both paper books and tablets to transition gradually.

**5. You are organizing a fundraiser, but donations are low. How can you improve participation?**

a) Cancel the event due to low interest.

b) Add fun activities like games to attract more people.

c) Reduce ticket prices to encourage participation.

**6. You read two articles about renewable energy. One has statistics and references, while the other only includes opinions. Which should you trust?**

a) The article with statistics and references.

b) The opinion piece because it is easier to understand.

c) Neither—more research is needed.

**7. A friend tells you a surprising fact but can’t remember the source. How should you react?**

a) Accept it because they are your friend.

b) Look up reliable sources to confirm the fact.

c) Consider information as unreliable.

**8. An advertisement claims a product is eco-friendly but provides no evidence. What should you do?**

a) Trust the advertisement.

b) Check for certifications or reviews about the product.

c) Avoid buying it due to lack of proof.

**9. Your teacher provides two examples of climate change effects. One is from a textbook, and the other is from a social media post. Which is more reliable?**

a) The textbook example.

b) The social media post.

c) Both, because they provide different points of view.

**10. A report about technology in schools includes graphs but no explanation. What is missing?**

a) Visual data like pictures.

b) Written analysis of the graphs.

c) More graphs to support the information.

**11. Some people believe AI tools will replace teachers. What is the best way to approach this issue?**

a) Use AI only for repetitive tasks and keep teachers for complex learning.

b) Replace teachers with AI to save costs.

c) Ban AI in education to avoid dependence on technology.

**12.You are asked to create a school recycling program. What should you prioritize?**

a) Educating students about recycling benefits.

b) Buying expensive equipment for recycling.

c) Only recycling items that are easy to process.

**13. During a group project, one member proposes a risky idea. How should you respond?**

a) Reject the idea immediately.

b) Discuss the risks and benefits with the group.

c) Accept the idea to try something new.

**14. Your class is tasked with planting trees to improve the environment, but there is limited space. What is the best solution?**

a) Plant trees only in areas with enough space.

b) Use vertical planting methods to maximize space.

c) Cancel the project because of lack of space.

 **15. A debate topic is “Should students have unlimited access to the internet at school?” What’s a reasonable opinion?**

a) Yes, because it provides access to resources.

b) No, because it distracts students from learning.

c) Allow limited access to ensure productive use.

Scoring System:

2 points: The answer demonstrates critical thinking, balanced reasoning, and aligns with problem-solving or evaluation criteria.

1 point: The answer shows partial reasoning or understanding but lacks depth.

0 points: The answer is incorrect or shows no critical thinking.

Interpreting Results

26–30 points: Advanced critical thinking—students consistently evaluate situations, make logical decisions, and reflect deeply.

20–25 points: Proficient critical thinking—students show good reasoning but may miss some depth in answers.

15–19 points: Developing critical thinking—students demonstrate basic skills but need improvement in analysis and decision-making.

Below 15: Emerging critical thinking—students struggle with logical reasoning and problem-solving; targeted instruction needed.

**Appendix C**

Problem-solving discussion

*Sample activity 1.*

Task: Problem-Solving

Topic: Environmental Issues

Objective: Use CT to analyze an environmental problem using the given vocabulary.

Materials: a list of vocabulary

Instructions and procedure: Imagine that you are a part of scientific group and your task is to reduce a negative impact of your city on the environment. You are to create an action plan that touches the following key problems: deforestation, pollution, overpopulation.

**1. Detect the problem.**

Use the following words and word-combinations to describe each problem: deforestation, pollution, overpopulation, ecosystem, acid rain, eco-friendly products, plastic waste, renewable energy, habitat loss, ecological footprint.

**2. Analyze the causes and impact.**

Think about causes of these problems and how they influence human lige and environment.

* What human actions contribute most to deforestation, pollution, overpopulation?
* How do these actions affect the greenhouse effect and climate change?

**3. Propose solution**

Suggest appropriate solutions to solve these issues. Use the same vocabulary.

**4. Collaboration and prioritizing**

In groups choose the solutions which should be done first and explain why using the same vocabulary. Then, share your ideas with other groups.

During this task, students have a possibility to defend their ideas, suggestions and evaluate offered solutions while practicing relevant vocabulary.

**Appendix D**

Context recognition

*Sample Activity 2.*

*Task:* Vocabulary application

Topic: Environmental issues

Objective: Help students identify and appropriately use vocabulary related to topic by analyzing specific scenarios and identify how the terms adress the context.

Materials: a worksheet with scenarios describing environmental changes; a list of vocabulary: climate change, biodiversity, pollution, habitat loss, ecosystem, renewable energy, deforestation, recycling, ecological footprint, sustainability.

Instructions and procedure:

**1. Read the following cases:**

a. "A local river is filled with plastic bottles and waste, harming the fish and plants that live there."

b. "The increasing use of coal and oil has led to rising global temperatures over the past century."

c. "More trees are being cut down in the Amazon rainforest to make space for farms, affecting many species of animals."

d. "Wind turbines and solar panels are being installed to reduce the reliance on fossil fuels."

**2. Match the words with suitable context**

Example: a → Pollution, b → Climate change

**3. Explanation of the choice**

For each matching students have to write an argumentation.

Example: Pollution passes the variant (a) because it describes the contamination of the river and it damages the ecosystem.

**4. Discussion in groups**

Students are to discuss whether they agree with each others' ideas and share different thoughts related to topic.

**Appendix E**

Predictive discussion

Task: Predictive thinking

Topic: Future prediction – The role of AI in education

Objective: Students will analyze the benefits and challenges of artificial intelligence (AI) in education, using critical thinking to predict how AI might change schools in the future. This activity helps students expand their vocabulary and encourages them to evaluate both opportunities and risks.

Materials: A short passage (teacher-prepared) about AI applications in education: Artificial Intelligence (AI) is transforming the way students learn and teachers work. Tools like virtual tutors personalize lessons to fit each student's pace and learning style, making education more efficient and tailored. For example, an AI tutor can provide extra exercises in areas where a student struggles while skipping topics they have already mastered. However, the growing dependence on AI raises concerns. Overusing AI tools might reduce students' ability to think critically and solve problems creatively. Moreover, issues of ethics arise, such as protecting students' private data and ensuring all schools have equal access to these technologies. While AI offers many benefits, balancing its use with traditional teaching methods is essential to maintain the human connection in education.

Vocabulary list with definitions, such as: efficiency, innovation, dependence, ethics, accessibility

Instructions and procedure:

**1. Pre-Reading Discussion**

Begin by asking students some questions to activate prior knowledge:

* What do you know about artificial intelligence?
* Have you ever used AI tools like ChatGPT, Duolingo, or Grammarly? How did they help you?
* Do you think AI is good or bad for education? Why?

**2. Vocabulary Introduction**

Provide a vocabulary list with terms that will appear in the passage, such as efficiency, ethics, innovation, and dependence.

Discuss each word with examples in sentences. For example: Efficiency - AI makes grading more efficient by saving teachers time.

**3. Reading the Passage**

Students read individually or in pairs and underline key vocabulary.

**4. Group Discussion**

Divide the class into small groups. Each group discusses and predicts using new vocabulary:

* How will AI affect education in 10 years?
* What balance should schools maintain between AI and traditional teaching methods?
* Do you think AI should replace human teachers in the future? Why or why not?

**Appendix F**

Reflective task

Topic: The Role of AI in Education

Instructions:

Reflect on the use of AI in education based on what you’ve learned from the passage, discussion, and group activities. Write a short reflection answering the following questions. Use at least three vocabulary words from the lesson (e.g., efficiency, dependence, ethics, accessibility).

What is your personal opinion on the increasing use of AI in schools? Do you think it improves or harms education overall? Why?

Think about your own learning experience. How would you feel about using an AI tutor instead of a human teacher? What are the advantages and disadvantages?

**Appendix G**

Post-test on critical thinking

1. Your city plans to introduce more recycling programs to reduce plastic waste, but residents are not participating actively. What should be the first step to improve participation?

a) Enforce strict fines for not recycling.

b) Educate residents about the benefits of recycling.

c) Provide more recycling bins throughout the city.

2. A local forest is being cleared for new housing developments, causing habitat loss. How can this be mitigated?

a) Relocate animals to other areas.

b) Design housing projects that preserve sections of the forest.

c) Allow the forest clearing but replant trees elsewhere.

3. Your school generates a lot of paper waste. Which is the most eco-friendly solution?

a) Use only digital assignments to eliminate paper use.

b) Set up recycling bins for paper and encourage their use.

c) Limit the amount of paper teachers can use.

4. Overpopulation in urban areas is leading to increased pollution. What is the best strategy to reduce its impact?

a) Encourage people to move to rural areas.

b) Invest in public transportation to lower vehicle emissions.

c) Ban new housing developments in cities.

5. A scientific team is studying the effects of acid rain on crops. What should they prioritize?

a) Educating farmers about the impact of acid rain.

b) Finding ways to reduce the emissions that cause acid rain.

c) Developing acid-resistant crop varieties.

6. Two articles discuss renewable energy:

Article A cites data about solar energy’s efficiency.

Article B criticizes solar energy without providing evidence.

Which article is more reliable?

a) Article A

b) Article B

c) Neither

7. A social media post claims wind turbines harm birds without citing a study. How should you respond?

a) Believe the post because it seems reasonable.

b) Research to confirm whether this claim is accurate.

c) Dismiss it because it’s on social media.

8. An advertisement promotes eco-friendly products but doesn’t explain how they are environmentally safe. What is missing?

a) Specific examples of how the product reduces waste.

b) A list of environmental certifications.

c) Both a and b.

9. Your teacher gives you two graphs about AI in education:

Graph A includes labeled data and a clear explanation.

Graph B lacks labels and context.

Which is more useful for understanding AI’s impact?

a) Graph A

b) Graph B

c) Both are equally useful.

10. A video about climate change uses emotional appeals but no scientific evidence. What’s your conclusion?

a) The video is informative because it’s persuasive.

b) The video lacks credibility without data or sources.

c) The video is reliable because it raises awareness.

11. AI tools like virtual tutors personalize learning for students. Do you think these tools should replace human teachers?

a) Yes, because they are efficient and cost-effective.

b) No, because human teachers provide personal connections and creativity.

c) It depends on the subject being taught.

12. Your class plans to organize a campaign to reduce deforestation. What should be the primary focus?

a) Raising funds to plant more trees.

b) Educating the community about deforestation’s impact.

c) Lobbying local governments to create strict deforestation laws.

13. Wind turbines are being installed to produce renewable energy, but some residents complain about the noise. How should the government respond?

a) Stop installing wind turbines.

b) Create noise-reduction technology for turbines.

c) Install turbines only in remote areas.

14. A debate topic is "Should AI be used to replace human creativity in art and writing?" Which is a reasonable opinion?

a) Yes, because AI can create art faster than humans.

b) No, because creativity is uniquely human and irreplaceable.

c) AI can assist in creativity but not replace it entirely.

15. Your city is considering banning single-use plastics to reduce waste. What is the most effective solution?

a) Ban single-use plastics entirely.

b) Promote alternatives like biodegradable products.

c) Educate citizens about reducing plastic use.

Scoring System:

Each question is worth 2 points.

2 points: Answer demonstrates clear critical thinking and logical reasoning.

1 point - answer shows partial understanding or lacks depth.

0 points - incorrect or no answer.

Total Score:

30 points maximum.

Interpreting Results

26–30 points: Excellent progress—students demonstrate advanced critical thinking and vocabulary skills.

20–25 points: Good progress—students show strong reasoning with minor gaps.

15–19 points: Moderate progress—students demonstrate some improvement but need more practice.

Below 15 points: Limited progress—students require additional support in critical thinking and vocabulary application.