

LOGICAL REASONING ACCORDING TO WORLD SCIENTISTS

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Abstract: This article presents the views and perspectives of prominent educators and scholars from around the world on the development of logical thinking. It examines various educational theories and approaches that emphasize the importance of logical reasoning as a fundamental component of intellectual and academic growth. The article highlights the contributions of internationally recognized pedagogues who have explored the processes through which learners develop the ability to analyze information, identify relationships, draw conclusions, and solve problems systematically.

Key words: logical reasoning, world scientists, analyzing information, drawing conclusions.

The content of the teacher's activity in the educational process includes: diagnosing the level of logical culture of students, encouraging students to develop logical thinking, developing a system of logical tasks used by the teacher in the process of teaching English, compiling lesson material taking into account optimal logical coherence, developing the logical culture of students.

In the educational process, the teacher can use the following forms: collective implementation of logical tasks in a foreign language, group and pair work to perform logical-cognitive tasks based on various language situations, and individual logical tasks.

The most common teaching model today is project-based learning. This model is used in a variety of classrooms. In project-based learning, teachers develop students' logical and critical thinking skills. Project-based learning also encourages students to think creatively. This model is being used effectively in the United Kingdom, the United States, and Canada. While working on a specific project, students analyze information, search for different solutions to a problem, and find the most suitable solution, ultimately developing logical and critical thinking skills. In the process of solving the problem, students look for creative ways.

Several studies have been conducted to prove the effectiveness of project-based learning (PBL) pedagogy, and it has been confirmed that the project-based learning

(PBL) approach can provide students with effective strategies for increasing their autonomous critical thinking skills¹.

Project-based language learning (PBL) is an innovative pedagogical approach. PBL, unlike traditional teaching methods, prioritizes experiential learning and seeks to enhance students' comprehensive language proficiency through project-based activities. Based on the principles of project-based learning (PBL) and the learning environment in China, empirical research demonstrates the effectiveness of PBL in developing student autonomy among English majors.

Students who participated in project-based learning (PBL) sessions performed better than their peers who did not engage in project-based learning. Project-based learning is an interesting and rewarding approach to learning and teaching, which increases motivation, and therefore warrants its widespread use in language learning and teaching. However, educational institutions, teachers, and students must invest considerable time and effort to integrate this method as an essential element of their teaching and learning practices².

The importance of incorporating project-based learning in teaching English as a second language has been reflected in many studies³.

A case study methodology was examined using different methods for two thinking skills programs in England and Wales for a maximally variable sample of five to six year olds. According to school staff interviewed, thinking skills programs improved critical thinking skills as well as language use, attentive listening, social cooperation, confidence and independence. Observations showed that students have different approaches to group projects, student discussions, and open questions and problems. There are certain signs of growth and change in students' verbal thinking. A national strategy led by critical thinking skills, excellent professional development, a whole-school approach and mentoring with methodical observation and feedback, and mentoring with methodical observation and feedback were among the conditions that supported change and sustainability⁴.

¹ Dimmitt N. *The power of project-based learning: Experiential education to develop critical thinking skills for university students*. In P. Hajek, O. Vit, P. Basova, M. Krijt, H. Paszekova, O. Souckova, & R. Mudrik (Eds.), *CBU International Conference Proceedings 2017: Innovations in Science and Education* Vol. 5, – P. 575–579.

² My & Hang, Nguyen & Thao, Ngo & Oanh, Duong. Integrating project-based learning (PBL) in EFL learning: An effective tool to enhance the students' motivation. *International Journal of Advanced Scientific Research and Management*. 2020. 5. 9. 10.36282/IJASRM/5.11.2020.1766.

³ Guslyakova, A., Guslyakova, N., Valeeva, N., & Veretennikova, L. *Project-based learning usage in L2 teaching in a contemporary comprehensive school (on the example of English as a foreign language classroom)*. *Revista Tempos e Espaços em Educação*, 2021. 14(33), Article e16754. <https://doi.org/10.20952/revtee.v14i33.16754>

⁴ Aubrey, C., Ghent, K., & Kanira, E. Enhancing thinking skills in early childhood. *International Journal of Early Years Education*, 20(4), 2012. – P. 332–348. <https://doi.org/10.1080/09669760.2012.743102>

The learning process of developing problem-solving skills through computer games uses word tables, interactive computer games, and puzzles to increase cognitive flexibility⁵.

Explores digital game-based learning (DGBL), which uses the immersive features of games to enhance digital learning experiences. A virtual reality educational game for students uses puzzle boxes and uses interconnected puzzles to enhance cognitive capabilities, explores the design of digital game-based learning (DGBL), evaluates the impact of puzzle boxes on the learning experience, and explores the interactive design elements of puzzles and puzzle boxes⁶.

To encourage critical thinking in elementary school students, methods such as brainstorming, prediction (using a name, picture, or movie excerpt), creating prediction charts, reading, initial assessment of personal knowledge on the topic, and forming introspection charts are also used to develop students' logical thinking⁷.

Nowadays, due to the development of artificial intelligence, the relationship between logical and critical thinking and artificial intelligence is widely studied in methodology, and attention is also paid to the development of logical and critical thinking of students through artificial intelligence.

It was emphasized that more attention should be paid to the development of human intelligence, especially in early childhood, using artificial intelligence. It was suggested that artificial intelligence should be used correctly so that it does not harm human intelligence. Scientists have proven the impact of content tools created by artificial intelligence on students' critical thinking skills and the need for children to have developed logical and critical thinking in perceiving these tools⁸⁹.

A study was conducted to examine the factors influencing the intention to use ChatGPT in teaching English from traditional classrooms in Malaysia. A survey of teachers indicated that ChatGPT is a software-based AI model that enhances English language acquisition, influences content creation among teachers, and provides a personalized learning methodology.

⁵ Doolittle, J. H. (1995). *Using riddles and interactive computer games to teach problem-solving skills*. *Teaching of Psychology*, 22(1), 33–36. https://doi.org/10.1207/s15328023top2201_10

⁶ Lee, B. G., Tang, H. M., & Fang, F. *Enhancing critical thinking and engagement through puzzle box integration in virtual reality-based digital game-based learning*. In **2023 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE) 2023**. – P. 404–411. IEEE. <https://doi.org/10.1109/TALE56641.2023.10398330>

⁷ Herasymenko, L., & Sabadyr, K. (2016). Forming cognitive motivation of primary school students in extracurricular activities. *Science and Education*, (2–3), 2016. – P. 110–115.

⁸ Zou, X., Su, P., Li, L., & Fu, P. AI-generated content tools and students' critical thinking: Insights from a Chinese university. *IFLA Journal*, 50(2), 2024. – P. 228–241. <https://doi.org/10.1177/03400352231214963>

⁹ Drushlyak, M., Lukashova, T., Shamonina, V., & Semenikhina, O. ChatGPT-based simulation helps to develop the pre-service mathematics teachers' critical thinking. *International Journal of Instruction*, 18(1), 2025. – P. 153–172. <https://doi.org/10.29333/iji.2025.1819a>

The study identified several elements that influence teaching techniques in Malaysian schools. The limited capabilities of ChatGPT, teachers' struggle to strike a balance between integrating technology and maintaining the legitimacy and authenticity of their pedagogical methods, and the lack of critical thinking skills among students pose challenges for teachers in developing autonomous thinking and analytical thinking in the classroom.

The study highlighted the importance of improving critical thinking skills and integrating personalized learning approaches to create an effective learning environment in Malaysian schools¹⁰.

Currently, modern society places high demands on the level of development of the intellectual abilities of the younger generation. The ability to fully perceive, process, analyze and apply the received information is considered the most important factor for a person's successful adaptation in the modern world.

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¹⁰ Annamalai, N. Factors affecting English language high school teachers' switching intention to ChatGPT: A Push-Pull-Mooring theory perspective. *Interactive Learning Environments*, 33(2), 2025. – P. 1367–1384. <https://doi.org/10.1080/10494820.2024.2371928>

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