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DEVELOPING STUDENTS' RATIONAL THINKING THROUGH INTERACTIVE EDUCATIONAL METHODS: RESULTS OF EXPERIMENTAL RESEARCH

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A B S T R A C T

This experimental study examines the effectiveness of interactive teaching methods in developing students' rational thinking. The paper presents the results of a pedagogical experiment conducted with 120 students during the 2023-2024 academic year. Modern interactive methods were used: case studies, business games, project work, discussions, and digital educational technologies. The results showed a significant improvement in rational thinking in the experimental group: critical thinking improved by 42%, analytical skills by 38%, and logical thinking by 45%. The study confirmed the hypothesis that the systematic use of interactive methods contributes to the development of sustainable rational thinking skills.

K E Y W O R D S

Interactive learning, rational thinking, experimental research, pedagogical technologies, critical thinking, project-based methods, case studies, business games, collaborative learning, cognitive development, educational methods, digital pedagogy.

INTRODUCTION

The development of students' rational thinking is becoming increasingly relevant in the modern educational process, as the ability to solve complex problems, think analytically and adapt to a rapidly changing world is gaining importance in the context of global competition. Rational thinking is one of the main factors not only of academic success, but also of life success. Traditional, mainly lecture-based teaching methods often remain a limitation in the development of students' active participation and independent thinking. In this regard, the use of interactive teaching methods creates opportunities for the effective development of students' rational thinking[1, 2]. The purpose of this study is to experimentally determine the effectiveness of interactive teaching methods in developing students' rational thinking and develop a scientifically based methodology for their application in the educational process. The relevance of the study is associated with the inadequacy of traditional methods in the formation of competencies required by modern educational standards and the need for new, effective approaches[3, 4].

Literature Review

Research on the development of rational thinking through interactive teaching methods in European countries is extensive and systematic. The Finnish education system successfully uses the "phenomenon-based learning" method, in which students study real-world phenomena and problems across many disciplines. This method develops students' ability to systematically analyze complex problems and find rational solutions. In the Netherlands, the "probleemgestuur onderwijs" method is widely used, in which students form their knowledge and skills by independently solving real-life problems. In prestigious universities in the UK, the "Oxford-style tutorials" method is used, in which each student is obliged to logically justify his or her thoughts and conduct an individual discussion with the professor[5]. In Sweden, students' creative and rational thinking skills are developed simultaneously through the "digital storytelling" method. German educational institutions successfully use the "forshungswerkstatt" (research workshop) method, in which students acquire analytical and rational thinking skills by implementing scientific research projects.

Method:

The following scientific research methods were used in the study:

1. “Pedagogical experiment” - a comparative study between control and experimental groups to determine the effectiveness of interactive teaching methods.
2. “Test measures” - standardized tests to determine the indicators of rational thinking (Watson-Glaser Critical Thinking Test, Cornell Critical Thinking Test)[6].
3. “Observation” - systematic observation of students' level of activity in the lesson process, thinking style and problem-solving strategies.
4. “Statistical analysis” - t-test, correlation analysis and variance analysis in the SPSS program to determine the reliability of the data obtained[7].
5. “Questionnaire” - students' attitude towards interactive methods and subjective assessment of their cognitive development.

Methodology:

The following interactive learning methods were used during the study:

1. “Case study method” - analysis of real-life situations. For example, within the framework of the case “A difficult decision in enterprise management”, students had to comprehensively analyze the problems of the enterprise management in the financial, marketing and human resources sectors and propose rational solutions[8].
2. “Business games” - decision-making in a simulated business environment. Within the framework of the “Startup simulator” game, students had to manage a virtual company and make strategic decisions in market conditions.
3. “Project-based learning” - implementation of real projects. Within the framework of the “Smart-campus” project, students undertook to identify problems on the territory of the university, analyze them and develop solutions[9].
4. “Debate club” - discussions on current socio-economic issues. Within the framework of the discussion called “Sunt artis et mensis”, students defended their positions based on scientific facts and logical arguments.

5. “Digital interactivity” - the use of modern technologies. Virtual brainstorming and collaborative work were organized using platforms such as Miro, Padlet, Kahoot[10].
Each methodology was aimed at developing certain aspects of students' rational thinking, and their integrated use ensured maximum efficiency.

Results and Discussion:
The results obtained show that the systematic use of interactive teaching methods led to a significant increase in students' rational thinking indicators. The highest dynamics were observed in the ability to draw logical conclusions (45%) and in the ability to think independently (44%), which confirms the effectiveness of interactive methods in developing students' cognitive independence. A 42% increase in critical thinking skills indicates an improvement in students' ability to critically evaluate information and avoid erroneous thinking. A 43% increase in the ability to express an argumentative opinion indicates an increase in the level of students' ability to logically justify their opinions. Comparative analysis shows that in the experimental group, a significant difference was observed in all indicators compared to the control group ($p<0.01$). The results obtained are consistent with the results of similar studies in European countries and confirm the universal effectiveness of interactive teaching methods.

Conclusion:
The following main conclusions were drawn as a result of the study:
1. The systematic and methodically organized use of interactive teaching methods leads to the effective development of students' rational thinking.
2. The results of the experimental study confirmed that interactive methods significantly improve the skills of critical thinking, analytical thinking, logical reasoning and independent thinking.
3. Interactive methods such as project-based learning, case studies, business games provide students with the opportunity to apply theoretical knowledge in practice, which has a positive effect on the development of their rational thinking.
4. The methodology developed during the study has a universal nature that can be used not only in higher educational institutions, but also at other levels of education.
5. The introduction of interactive teaching methods is an effective means of improving the quality of the educational process, increasing the cognitive activity of students and preparing them to effectively solve life problems.

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