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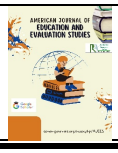

| Research Article

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The Enhancement of Student`S Technical Thinking Skill`S in the Instruction of Technology Subjects

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Abstract: The article's focus is on analyzing issues pertaining to students' development of technical thinking abilities when teaching technology subjects. The study looks at the current challenges and barriers that educational institutions and technology teachers face when it comes to helping students build technical thinking abilities. The authors of the paper take into account elements like the lack of efficient techniques for evaluating technical thinking skills and the inadequate focus on the development of creative abilities in education. The article talks about potential methods and techniques to get rid of these issues and technical thinking when teaching technology. This analysis, which takes into consideration the development of technical thinking abilities in teaching technology subjects, offers significant recommendations for enhancing educational practice and boosting its efficacy.

Keywords: Creativity, technical thinking, problems, education, curricula, assessment, standardization, creative aspects, educational practice, skills development.

Introduction

The development of technical thinking and creativity in students is a critical issue in modern education, particularly in technical disciplines. As technology advances rapidly, the ability to think critically, solve problems creatively, and innovate has become increasingly essential for future professionals. However, various challenges hinder the integration of creativity in teaching technical subjects, such as rigid curricula, lack of creative-focused teaching methods, and inadequate assessment systems. This study aims to explore these barriers and propose strategies to enhance the development of students' technical thinking and creative abilities in the context of technological education. The goal is to provide educators and policymakers with insights into how to foster a more creative and technically capable workforce.

Overview. One of the most pressing issues facing the educational system today is the growth of pupils' technological thinking. Unquestionably, technical thinking which is defined by logical and

analytical approaches to problem-solving should be enhanced with a creative element that aids in the development of creative projects, the pursuit of novel solutions, the resolution of technical challenges, etc. However, a number of issues prevent creativity from developing in educational institutions, even if it plays a vital role in teaching technology subjects.

The primary issues surrounding the growth of students' technical thinking and creativity in the teaching of technological subjects will be discussed in this article. We examine the challenges that learners and educational establishments encounter in this domain and propose potential methods and tactics to address these issues. Our analysis enables us to formulate suggestions for enhancing the efficacy of learning and to gain a deeper understanding of the intricacies related to the development of creativity in technical education.

The relevance of the topic is explained by the fact that in the modern world, with the constant development of technologies in all areas, including educational technologies, the creative abilities of a person play an important role in ensuring innovative progress and successful competitiveness. In particular, at a time when new technologies and solutions that can change the world are emerging every day, we considered it appropriate to once again recall the need to develop creative thinking skills in students and schoolchildren in the field of technical sciences.

Despite the recognition of the importance of students' creative abilities in teaching technological subjects, there are a number of problems that hinder their development in practice. These problems mainly consist of standardization of curricula, insufficient attention to the development of creative aspects in education, and limited methods of assessing creativity. Therefore, analyzing these problems and identifying errors and shortcomings, and proposing strategies and approaches for their effective solution are urgent and important tasks for modern educational practice.

The materials in this article are useful for teachers, methodologists, and heads of educational institutions interested in effectively developing students' technical thinking creativity. It also offers new ideas and approaches to improve the educational process as a whole, contributing to the development of not only students' technical but also creative potential.

Methodological research methods in practice: questionnaires, observation and analysis of practical exercises, comparative analysis of curricula.

Literature review: Research in the field of developing technical thinking skills in students is relevant and multifaceted. They include various approaches to studying and developing creative, personal qualities of students, as well as methods aimed at stimulating creative thinking in the educational process.

Bazilevich (2003) describes the experience of studying the creativity of students of a technical university, highlighting the main aspects that affect the development of creative thinking in an educational environment.

Utemov and Gorev (2017) offer a practical guide to developing creative thinking using TRIZ (Theory of Inventive Problem Solving) methods and techniques, which allows stimulating students' creativity.

Ryndak, Moskvina, and Labzina (2015) examined the methods and techniques for forming creative thinking of students of technical universities, highlighting the importance of this process for future scientific and technical activities.

Znikina and Graborskaya (2017) emphasize the role of foreign language teaching in the formation of creativity, drawing attention to the importance of developing students' creative thinking through communicative education in a foreign language.

Shipilov and Piminov (2021) share experience in developing students' creative thinking in the process of technological education, demonstrating practical aspects of stimulating creativity within the framework of educational programs.

Other studies, such as Yeremina, Nagornova (2013), suggest the use of special technologies for the creative development of technical specialization experiences, which emphasizes the need to introduce innovative approaches in the educational process.

Many authors, such as Grakhov, Kislyakova and Simakova (2015), Labzina (2011,2013) and Malseva (2017), pay attention to the importance of forming the creative potential of technical university students and offer various methods and techniques to achieve this goal.

Approaches to developing students' creativity are explored in the works of Gurye and Redin (2004), Yerokhin, Sudnik, and Nazarova (2012), as well as Pershina (2019), where the main focus is on various teaching methods and the formation of creative thinking.

In addition to the above-mentioned studies, the works of Gorev and Utemov (2017), Yerokhin, Sudnik, and Nazarova (2012), and Utemov (2012) offer various methods for diagnosing and assessing the level of creativity of students, which helps to effectively identify and analyze factors affecting the development of creativity.

The works of Grakhov, Kislyakova, and Simakova (2015) and Labzina (2011,2013) also emphasize the importance of learning in an interdisciplinary context, where students can combine their knowledge from different fields to create new ideas and solutions.

The study of Stepanov and Savina (2013) is devoted to the concept of creative economy and its development of creative thinking in education, which makes the issues of preparing students for the modern requirements of the labor market relevant.

This literature review demonstrates the multifaceted nature of the approaches and methods used in research on the development of students' creative technical thinking. These methods offer a comprehensive consideration of existing problems and practical approaches to their effective solution in the educational environment.

The study's goal was to pinpoint the primary challenges and barriers that students face when developing their technical thinking abilities while learning technology subjects. **The research's primary goals are:** to analyze current issues with students' creative thinking skills development when teaching technological subjects; identify barriers to students' effective development of creative thinking skills in the field of technological subjects and devise strategies to overcome them; investigate the effects of curriculum standardization on students' technical thinking skills development, the lack of emphasis on the development of their creative aspects, and the limited ways of evaluating creativity in the educational process;

to propose strategies and approaches to eliminate problems and stimulate creative thinking in teaching technological subjects;

to formulate recommendations for teachers, methodologists, and heads of educational institutions aimed at improving the effectiveness of the educational process and developing students' creative abilities in the field of technological subjects.

Methodology

The research methodology employed in this study includes a combination of qualitative methods such as questionnaires, observation, and practical exercise analysis. A comparative analysis of curricula is also conducted to identify the discrepancies and gaps in fostering students' creative and technical thinking skills in technology education. The use of questionnaires allows for the collection of data regarding students' experiences, while observations provide insights into how creativity is integrated into the teaching process. The comparative analysis of curricula helps

identify areas where creativity is underemphasized and where improvements are needed to enhance the development of creative and technical skills in students. These methods collectively aim to provide a comprehensive understanding of the challenges in fostering creativity within technical education.

Results and discussion of the research.

Results of the study:

1. Curriculum standardization: One of the primary issues is that standardized courses restrict originality. Programs designed to meet certain learning objectives may be designed to teach information and techniques that are harmful to students' growth as creative beings.
2. Inadequate focus on creative aspects: In certain educational institutions, the development of creative components in the teaching of technological disciplines receives insufficient attention. Students' creativity may be hampered by a lack of chances for autonomous and imaginative thought.
3. Limited methods of assessing creativity: Existing methods of assessing the success of teaching in technological subjects often focus on quantitative indicators and the correctness of answers, while ignoring creative approaches and innovative ideas.

Analysis of the findings: The issues that have been highlighted highlight how crucial it is to alter teaching methods in order to actively foster students' technical thinking abilities. In order to incorporate creative tasks and projects into the learning process, educators should work to develop more adaptable curriculum. New evaluation techniques that consider students' creative accomplishments and support their growth must also be developed. In order for instructors to successfully execute these changes, they also require assistance. Only then would it be feasible to fully utilize creativity in technical education and get students ready for successful careers in the cutting-edge, contemporary society of the future.

We provide a number of useful suggestions to address the challenges associated with fostering innovative technical thinking in the instruction of technology courses:

1. Include innovative exercises in the teaching of technology into the educational process: Incorporate innovative assignments, projects, and work phases into the curriculum to provide students the chance to use what they have learned in novel, unconventional contexts.
2. Encourage self-research: Encourage students to conduct self-research and experiment outside the classroom. Provide resources, laboratories, and equipment for working with their own projects.
3. Develop critical thinking: Teach students to think critically and analyze. Encourage them to ask questions, express doubts, and look for alternative solutions.
4. Learning in an interdisciplinary context: Create interdisciplinary learning opportunities that allow students to combine their knowledge from different fields to solve school problems.
5. Teaching creative thinking techniques: Incorporate creative thinking techniques such as brainstorming, analogy, conflict resolution, and others into the learning process.
6. Teaching creativity assessment methods: Teach students how to assess creativity and encourage them to use a variety of assessment methods that take into account not only the correctness of answers, but also the originality and innovation of thinking.
7. Supporting and developing teachers' professional competence: Conduct training and seminars for teachers on the development and use of methods to stimulate creativity in the learning process.

8. Create a learning environment: Provide students with access to inspiring learning resources, cultural activities, and communities that support creative thinking.

By following these suggestions, the difficulties of fostering technical thinking creativity will be successfully addressed, and an engaging learning environment that fosters the generation of creative concepts and solutions will be established.

In conclusion. The following observations can be made at the conclusion of the article on the challenges of fostering technical thinking creativity.

Students who cultivate their imagination are more equipped to solve contemporary difficulties and succeed in the workforce. A survey of the literature, however, reveals that there are a number of barriers to accomplishing this objective. Examining these issues is a crucial first step in identifying practical approaches and techniques for encouraging students' creativity.

Numerous research have pointed out the drawbacks and restrictions of the current approaches to education and creative development. It is appropriate to note that methodological issues related to the inadequate application of innovative teaching strategies and organizational factors, including low student motivation, are to blame for this.

In conclusion, it should be highlighted that the development of technical thinking abilities necessitates all-encompassing strategies that consider enhancing the practical components of education. Future research in this field might result in the creation of fresh strategies and techniques that can foster creativity more successfully.

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