IMPROVING HOW WE PREPARE MASTER'S STUDENTS IN TECHNICAL FIELDS FOR RESEARCH: PROBLEMS AND PRACTICAL SOLUTIONS

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Abstract: *This article examines how to improve the training of master's students in technical fields to better prepare them for research activities. It identifies major challenges faced by students and educators in developing research competence and offers practical strategies for improvement. The proposed solutions emphasize motivation, systematic training, mentorship, collaboration with industry, and the use of digital technologies to bridge the gap between theory and practice. The findings underline the importance of cultivating a culture of scientific inquiry as a key factor in raising the quality of engineering education.*

Keywords: *Research training, master's students, technical education, motivation, higher education, research methodology, innovation, mentorship, digital technologies, scientific culture.*

1. INTRODUCTION

In today's rapidly evolving world, the role of science and technology in social and economic development is greater than ever before. Engineers and technical specialists are expected not only to apply existing knowledge but also to create new solutions through research and innovation. Universities must focus on developing students' research potential from the early stages of their education, particularly during master's studies, when foundations of independent scientific thinking are formed.

However, many universities still struggle to provide effective research training. Students often complete their master's degrees without gaining real research experience or understanding how to apply research methods in practice. This article discusses the main problems that cause such outcomes and proposes practical ways to enhance research training.

2. Methods

This study adopts a qualitative and analytical approach. Data were gathered from academic reports, surveys of graduate students in technical programs, and interviews with faculty members responsible for research training. The analysis focused on identifying recurring challenges in research preparation, evaluating existing practices, and suggesting practical improvements. Additionally, case

studies from universities that successfully integrate research training into their technical master's programs were examined to highlight best practices.

The methodology also includes comparative analysis between traditional research training methods and innovative approaches that incorporate digital tools, project-based learning, and industry collaboration. By combining literature review, empirical data, and practical case studies, the study provides a comprehensive view of the current state of master's research training and feasible solutions for improvement.

3. Main Problems in Research Training

3.1. Lack of Motivation

Many students see graduate school as merely a continuation of undergraduate studies, rather than as a stage for professional growth and creative exploration. Limited understanding of the importance of research, unclear objectives, and weak connections between academic projects and industry challenges contribute to low motivation. Without genuine interest, students tend to complete research work formally, focusing on fulfilling requirements rather than developing original ideas.

3.2. Fragmented and Theoretical Training

Research training in many programs is reduced to theoretical lectures or basic report writing. Students are rarely given opportunities to conduct experiments, design projects, or work in laboratories, limiting their ability to develop essential research skills.

3.3. Weak Connection Between Education and Industry

Many master's thesis topics are disconnected from real-world industrial problems. This gap prevents students from applying theoretical knowledge to practical situations and reduces their preparedness for professional challenges.

3.4. Insufficient Research Skills

Students often lack the necessary skills in experimental design, data analysis, scientific writing, and using digital research tools. This hinders their ability to independently carry out meaningful research projects and limits their confidence in research competence.

4. Proposed Solutions

4.1. Developing a Comprehensive Methodological System

An integrated research training system combining lectures, laboratory work, project-based learning, and seminars allows students to gain both knowledge and practical skills. This approach fosters independent thinking and problem-solving abilities.

4.2. Strengthening Mentorship and Academic Guidance

Mentorship is crucial for developing research skills. Supervisors guide students through idea formulation, experimental design, data collection, and analysis, while inspiring curiosity and critical thinking.

4.3. Enhancing Collaboration with Industry

Partnerships with companies, internships, and joint projects help students apply theoretical knowledge to real-world problems. This approach increases practical skills, motivation, and career readiness.

4.4. Integrating Digital Tools into Research Training

Virtual laboratories, simulation software, and online research platforms expand learning opportunities, even in resource-limited settings. These tools enhance data analysis, modeling, and experimental design capabilities.

4.5. Encouraging a Research-Oriented Mindset

Participation in conferences, research publications, and discussions cultivates curiosity, accountability, and scientific culture, helping students develop professional competencies and confidence.

5. Discussion

Improving research training requires more than adding courses; it requires a shift toward interactive, inspiring approaches connecting theory with practical innovation. When students are responsible for meaningful research, they develop independence, creativity, and analytical thinking, which are crucial for professional success.

Collaboration among universities, industry, and research institutions ensures students' knowledge is relevant and applied to solving real-world challenges, bridging the gap between theory and practice.

6. Conclusion

Preparing master's students in technical specialties for research activity is a critical task for higher education. A systematic methodology incorporating motivation, mentorship, industry collaboration, and digital tools can significantly enhance research competence. By fostering creativity, accountability, and innovation, universities can prepare a new generation of engineers and researchers ready to tackle the challenges of modern science and technology.

The inclusion of structured methods, practical experience, and industry engagement ensures that research training is not merely academic, but a transformative process shaping capable and innovative professionals.

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Абелкосимова М.Х. Факторы, влияющие на качество развития научноисследовательских компетенций у магистров технических специальностей. "Экономика и социум" №5(108)-2 2023