

# Robotics in STEM Education: Enhancing Engagement, Skills, and Future Readiness

**Prity Choudhary and Pooja Potdar**  
University of Tampa, Tampa, Florida

**Abstract:** *The research explores the influence of robotics education on students' engagement, development of competencies, and career preparation in the field of STEM (Science, Technology, Engineering, Mathematics). With the increased integration of robotics into traditional curriculum, the development of fundamental 21st-century skills and better preparation for future careers are possible. However, evidence about its effectiveness in education has been scant. This, therefore, brings in the need for the current research, focusing on STEM students who are robotics enthusiasts, to explore how robotics activities influence engagement, competency development, and career readiness. Through a data-driven approach entailing surveys, interviews, and performance assessments, this study examines how robotics could effectively be integrated into STEM education to yield better student learning outcomes. The findings provide evidence-based recommendations on how best robotics integration can be optimized in educational settings by educators and curriculum developers. Besides technical competencies, it underlines the development of creativity, collaboration, and flexibility, or critical competencies at the core of a fast-changing technology environment.*

**Keywords:** Robotics Education, STEM Education, Student Engagement, Competency Development, Career Readiness, 21st-Century Skills, Problem-Solving, Instructional Design, Engineering Education, Technology Careers, Data-Driven Insights, Robotics Competitions, Skill Acquisition