
Enhancing Electronic Engineering Education: Evaluating the Impact of 'Protokits' on Student Learning and Engagement Across Different Educational Levels

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Abstract

The evolving educational landscape in electronic engineering presents challenges in effectively bridging theoretical concepts with hands-on practice, often resulting in disengaged learners across various educational levels. Traditional tools lack the flexibility to meet diverse learning needs, highlighting a gap in accessible, interactive resources. This study introduces Protokits, an educational prototyping tool designed to enhance student engagement, reduce wiring errors, and simplify programming in electronics education. Through a sample of 50 students from primary and polytechnic levels, this research evaluates Protokits' effectiveness in improving learning outcomes. A survey consists of several compressive question regarding the effectiveness of Protokit in enhancing and engagement learning experiences of students was answered at the end of the active learning session. Whereas, statistical analyses of the survey results indicates that Protokits significantly increases student satisfaction by streamlining complex tasks, minimizing setup time, and fostering a user-friendly environment for both foundational and advanced applications. These findings suggest that Protokits is an adaptable, scalable solution for enhancing electronic engineering education, providing a practical platform that strengthens comprehension and engagement. Future research should explore further customizations to optimize Protokits for younger students' unique learning requirements.

Keywords: *Engineering Education, Electronic Engineering, Student Engagement, Teaching Aids, TVET, Protokits.*
