A framework for cognitive development: fostering critical and creative thinking skills, using iSTEM approach

Abstract

As the demand for a future-ready technical workforce intensifies, educational institutions are increasingly focused on equipping students with essential higher-order thinking skills such as critical thinking, problem-solving, and creativity. This study aims to develop a framework to enhance students' cognitive abilities by fostering critical and creative thinking skills. The research will compare two pedagogical approaches: traditional teaching and integrated STEM education, which incorporates the Design Thinking Process, which includes five iterative stages: Empathise, Define, Ideate, Prototype, and Test. Using mixed-methods research design, the study will investigate the impact of transdisciplinary integrated STEM versus traditional education on students' cognitive engagement. Quantitative data will be collected through pre-test and post-tests from middle school students in Darwin, whereas Qualitative data qualitative data will be gathered through semi-structured interviews with middle and high school teachers, who will reflect on the outcome of quantitative data and the effectiveness of each pedagogical approach. The findings aim to inform an educational framework for educators, administrators, and policymakers to implement strategies that nurture higher-order thinking skills in education. This research emphasises the importance of real-world learning, collaboration, and technology integration as key competencies for preparing students for a dynamic, future-oriented workforce.