Outcomes of an integrated STEM with design thinking module on preschoolers' engineering practices

ABSTRACT

Research indicates that utilizing engineering design processes such as design thinking (DT) to integrate science, technology, engineering, and mathematics (STEM) disciplines yields positive outcomes. However, there is limited study on the effects of STEM education on preschoolers' engineering practices. This case study evaluation examined the outcomes of an integrated STEM with DT module on preschoolers' engineering practices in a private preschool in Malaysia. Two preschool teachers facilitated the learning of twenty preschoolers in two classes daily over four weeks. Data was collected through interviews and direct classroom observations, including fieldnotes, students' artefacts, photos, voice, and video recordings. The qualitative data were analyzed inductively through thematic analysis. The findings indicated that the preschoolers engaged in numerous engineering practices while they actively participating in learning tasks. During their efforts to solve problems using DT process, they showed compassion for the characters in the stories and successfully defined the problem. The findings also highlighted the preschoolers' ability to design and sketch their ideas. They demonstrated proficiency in constructing, testing, analyzing and evaluating their designs, as well as generating ideas to improve them and solve problems. Additionally, the results provided evidence that the engineering design process fosters collaboration and communication. Through iterative testing and modification, the preschoolers exhibited persistence and very positive learning dispositions.