Summary: This paper discusses changes in young children’s learning performance and efficiency during clinical interviews in which each child interacted with a variety of virtual manipulative mathematics apps on iPads. Researchers interviewed 100 children ages 3 to 8 using a protocol formal with two pre-assessment apps, four learning apps, and two post-assessment apps. Data were gathered quantitatively and qualitatively, using wall and screen-capture videos, pre and post assessments of performance, and time-stamping to record efficiency. Following 30–40 minute interviews where children interacted individually with the mathematics apps, results showed that children in the preschool group increased efficiency while maintaining performance, children in the kindergarten group increased performance while maintaining efficiency, and children in the grade 2 group increased their performance and efficiency in skip counting, but not in place value. Overall, children in different age groups responded in different ways to the apps and some apps had a greater influence on children’s learning performance and efficiency than others. To conduct this study, researchers created a variety of research tools that were not readily available because research on children’s interactions with touch-screen-based virtual manipulative mathematics apps is still in its infancy. The paper describes the processes our research team used to develop new tools for novel and unique research situations.

Classification: U51 U52 U71 U72 C31 C32

Keywords: virtual manipulatives; iPad apps; learning performance; efficiency; assessment