Raising early achievement in math with interactive apps: A randomized control trial.

# Details

## Year

2019

## DOI

10.1037/edu0000286

## Issued

2019

## Language

English

## Volume

111

## Issue

2

## Start Page

## End Page

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## Type

Journal article

## Journal

Journal of Educational Psychology

## Publisher

American Psychological Association (APA)

## Topics

## Sample

461 children aged 4–5 years randomly allocated to one of the three groups: 153 children assigned to Group 1 (treatment; math app intervention and standard daily math teaching); 152 children in Group 2 (time-equivalent treatment; math app instead of daily math teaching) and 156 children in Group 3 (control; math teaching only).

## Implications For Educators About

STEM Education

## Implications For Policy Makers About

High-quality content online for children and young people

## Implications For Stakeholders About

Industry

# Abstract

Improving provision and raising achievement in early math for young children is of national importance.
Child-centered apps offer an opportunity to develop strong foundations in learning math as they deliver
one-to-one instruction. Reported here is the first pupil-level randomized control trial in the United
Kingdom of interactive math apps designed for early years education, with 389 children aged 4–5 years.
The original and rigorous research design disentangled the impact of the math apps as a form of quality
math instruction from additional exposure to math. It was predicted that using the apps would increase
math achievement when implemented by teachers in addition to standard math activities (treatment) or
instead of a regular small group-based math activity (time-equivalent treatment) compared with standard
math practice only (control). After a 12-week intervention period, results showed significantly greater
math learning gains for both forms of app implementation compared with standard math practice.
The math apps supported targeted basic facts and concepts and generalized to higher-level math
reasoning and problem solving skills. There were no significant differences between the 2 forms of math
app implementation, suggesting the math apps can be implemented in a well-balanced curriculum.
Features of the interactive apps, which are grounded in instructional psychology and combine aspects of
direct instruction with play, may account for the observed learning gains. These novel results suggest that
structured, content-rich, interactive apps can provide a vehicle for efficiently delivering high-quality
math instruction for all pupils in a classroom context and can effectively raise achievement in early math.

# Outcome

"This study found that combining child-centered, curriculumbased,
apps with interactive touch-screen tablet technology for
children aged 4–5 years old in the first year of school provides an
effective means of delivering quality instruction that promotes the
development of early math skills...children in Group 1 (treatment) who used the math apps in addition
to all normal math practices were 3–4 months ahead of their peers
in Group 3 (control) receiving standard practice only (betweengroups
effect size 0.31). Children in Group 2 (time-equivalent
treatment) who used the math apps instead of one daily regular
small group math activity were shown to be approximately 2
months ahead of children in Group 3 (control) receiving standard
practice only (between-groups effect size 0.21). However, there
was no significant difference between implementing the math apps
as well as all standard math practices or instead of one regular
small group math activity. This indicates the apps are a form of
quality math instruction" (Outhwaite et al, 2019: 239).