

# A Modified Cover, Copy and Compare Math Fact Fluency Intervention

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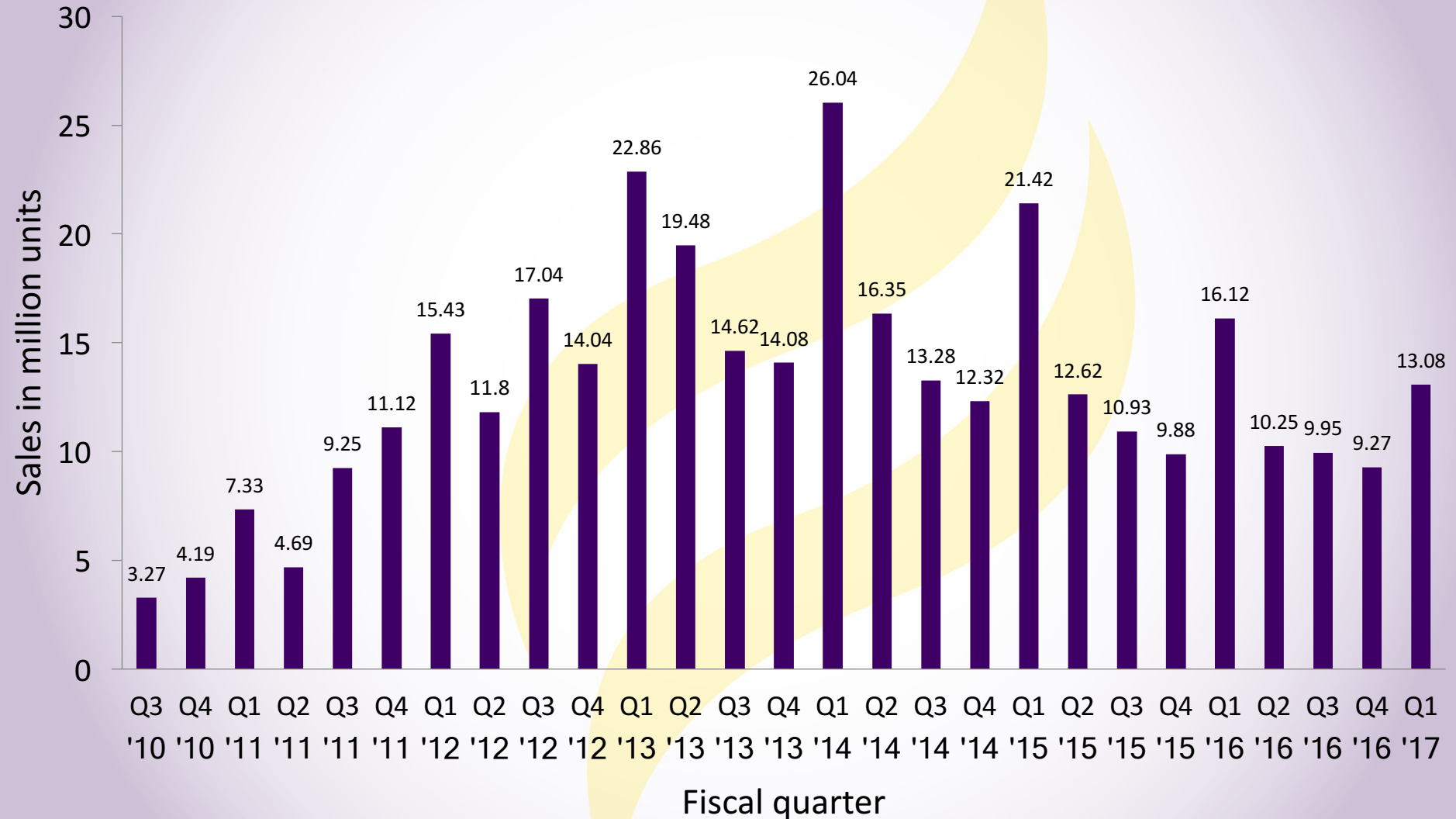
# Agenda

- Introduction
- Method
- Interventions
- Results
- Discussion

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# Introduction

# Global Apple iPad Sales



# What can iPads bring to the classroom?

- **Individualized instruction**

- (Draper-Rodriguez, Strnadova, & Cumming, 2014; Hutchison, Beschorner, & Schmidt-Crawford, 2012; International Reading Association, 2009; Larson, 2010; Shank, 2005)

- **Interactive instruction**

- (Larson, 2010; Marsh, 2010; Mayer, 2005; Shank, 2005)

- **Increased participation and engagement**

- (Avila, Biner, Bink, & Dean, 1995; Cumming & Draper-Rodriguez, 2013; Larson, 2010; Mayer, 2005; Means, Toyama, Murphy, Bakia, & Jones, 2010; Messinger-Willman & Marino, 2010)

# Have iPads been used as an Evidence-Based Practice?

- Educational improvement due to the increased participation and engagement rather than the use of the iPad
  - (Hutchison et al., 2012; Means et al., 2010; Messinger-Willman & Marino, 2010;)
- Classroom Goals get lost in the hype of new technology
  - (Hutchison et al., 2012; Karsenti & Fievez, 2013)
- Barriers could outweigh benefits
  - (Falloon, 2013; Means et al., 2010; Messinger-Willman & Marino, 2010)
- Survey of teachers k-12 found that teachers thought iPads were most beneficial for use in math
  - (Ray & Panahon, 2015)
- Math fact fluency iPad intervention in comparison with Cover, Copy and Compare intervention was more effective
  - (Haydon et. al., 2012)

# Cover, Copy and Compare

- An effective intervention for math fact fluency
  - It is a test- study method
  - Found to be productive for grades 1-12 in all educational settings
  - Effective in math fluency problems (Kitchens, 2012)
    - Maintenance of findings
- Could this intervention be electronic?

# Purpose of the Study

- Extend the work of Haydon and colleagues
- Evaluate the effects of iPads on math fact fluency
- Evaluate the acceptability of iPad math fact fluency intervention and cover-copy-compare worksheets as reported by students.



# Research Questions

- Were the interventions effective for increasing math fact fluency?
- Was iPad condition growth significantly greater than the CCC worksheet condition growth?
- Was one intervention more acceptable to students than the other?

The background features two large, overlapping, yellow wavy shapes that resemble flames or stylized leaves, set against a light purple gradient background. The word "Method" is centered within these shapes.

# Method

# Project Design

- Counterbalanced within-subjects design
  - 20 fourth graders
  - Randomly assigned into 2 equal groups
    - Group 1: iPad then Cover-Copy-Compare
    - Group 2: Cover-Copy-Compare then iPad
- 8 weeks
  - 4, 10-minute sessions per week
  - 4 weeks of each intervention
    - Worksheet intervention: Cover-Copy-Compare
    - iPad intervention: Flashcards Deluxe

# Timeline

- Pre-test
- Weeks 1-4
  - Group 1: iPad intervention
  - Group 2: Worksheet intervention
- Mid-test & Kids Intervention Profile (KIP) 1 (Eckert, Coddling, Hier, Sullivan, & Malandrino, 2014)
- Weeks 5-8
  - Group 1: Worksheet intervention
  - Group 2: iPad intervention
- Post-test & Kids Intervention Profile 2 (Eckert, Coddling, Hier, Sullivan, & Malandrino, 2014)

# Fidelity Results

- Fidelity
  - 4 sessions (25%) during weeks 1-4
  - 5 sessions (25%) during weeks 5-8
  - IOA was 100% for both interventions
- Inter-scorer agreement
  - 20% of the sessions during weeks 1-4
  - 20% of the sessions during weeks 5-8
  - ISA was 100% for both interventions

Three yellow wavy lines, resembling flames or stylized waves, are positioned behind the text. They originate from the bottom and curve upwards and to the right.

# Interventions

# Cover, Copy, and Compare

- Randomized multiplication fact lists were created
  - 0s – 12s
  - Task interspersal
  - 15 total problems on each worksheet
- Test-study method
  - Modeling, practice, corrective feedback
- Shown to be effective at increasing math performance
  - (Joseph, Konrad, Cates, Vajcner, Eveleigh & Fishly, 2012; Skinner, McLaughlin, & Logan, 1997)

NAME \_\_\_\_\_

|                      |    |    |
|----------------------|----|----|
| $6 \times 9 = 54$    | a. | b. |
| $12 \times 6 = 72$   | a. | b. |
| $1 \times 12 = 12$   | a. | b. |
| $5 \times 12 = 60$   | a. | b. |
| $5 \times 4 = 20$    | a. | b. |
| $2 \times 9 = 18$    | a. | b. |
| $3 \times 9 = 27$    | a. | b. |
| $7 \times 9 = 63$    | a. | b. |
| $8 \times 1 = 8$     | a. | b. |
| $4 \times 5 = 20$    | a. | b. |
| $11 \times 10 = 110$ | a. | b. |
| $0 \times 8 = 0$     | a. | b. |
| $1 \times 9 = 9$     | a. | b. |
| $8 \times 6 = 48$    | a. | b. |
| $4 \times 1 = 4$     | a. | b. |



# iPad Intervention

- Flashcards Deluxe App
  - Imported math fact lists used on worksheets
  - Changed so that students had to enter the text rather than just flip the virtual flashcard
  - Required a correct answer to be provided before moving on to next problem
  - Changed settings to provide immediate feedback

6x9

6x9=54

12x6

0

12x6=72

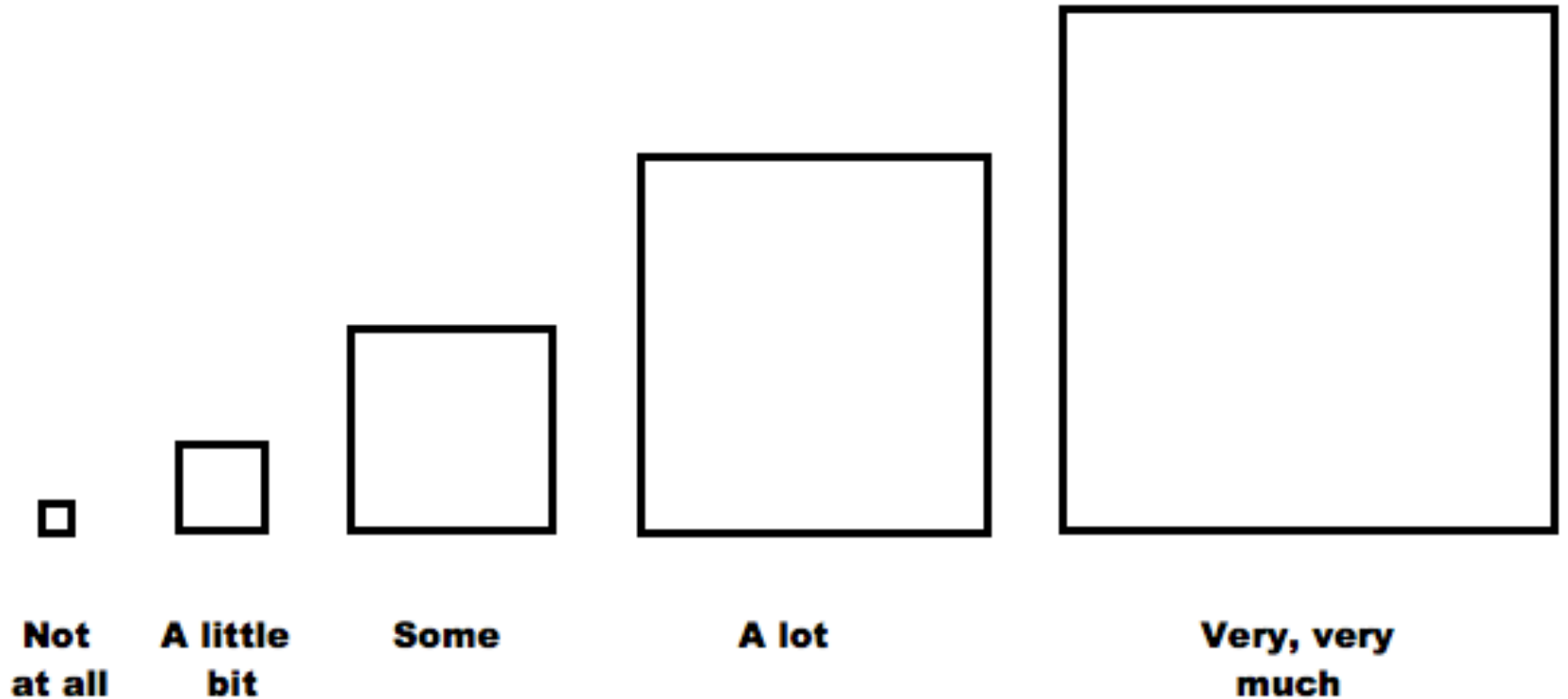
Score:  
11 of 15 = 73%

(tap to continue)

Today  
Time Studied 4 min  
Correct % 73% (11 of 15)

# Kids Intervention Profile (KIP)

How much do you like [insert specifics of intervention]?





# Results

# Was one intervention more acceptable to students than the other?

|  | iPads | CCC  | Sig. |
|--|-------|------|------|
| How much do you like practicing math facts?  | 3.2   | 3.15 | 0.87 |
| How much do you like practicing math facts on the _____?                           | 3.4   | 3.1  | 0.27 |
| Were there times when you didn't want to practice math facts on the _____?         | 2.47  | 2.47 | 1.00 |
| Were there any times when you wished you could work on the _____ more?             | 2.47  | 2.42 | 0.91 |
| How much do you like using _____?  | 3.32  | 3.21 | 0.80 |
| How much do you think the _____ helped you practice math facts?                    | 3.28  | 3.44 | 0.64 |
| Do you think your math fact skills have improved by practicing on the _____?       | 3.22  | 3.00 | 0.61 |
| Do you think your math fact skills have gotten worse from practicing on the _____? | 1.05  | 1.05 | 1.00 |

# Were the interventions effective for increasing math fact fluency?

Yes,  $p=.003$ ,  $d=.31$

|                 | <i>M</i> | <i>SD</i> |
|-----------------|----------|-----------|
| <b>Pretest</b>  | 30.43    | 16.93     |
| <b>Posttest</b> | 35.62    | 16.55     |

# Growth and Interventions

- Was iPad growth significantly greater than Cover-Copy-Compare worksheet growth?
  - Ruling out order effect:
    - Did order have an effect on growth during either of the iPad or CCC worksheet conditions? No,  $p=.62$  and  $p=.63$ , respectively.
    - Did order have an effect on students' posttest scores? No,  $p=.66$ .

# Growth and Interventions

- Was iPad growth significantly greater than the Cover-Copy-Compare worksheet growth?

No,  $p, .94$

|                         | <i>M</i> | <i>SD</i> |
|-------------------------|----------|-----------|
| <b>iPad Growth</b>      | 2.70     | 6.32      |
| <b>Worksheet Growth</b> | 2.50     | 7.80      |





# Discussion

# Summary

- Both interventions resulted in growth
- iPad growth was not significantly greater than worksheet growth
- Student acceptability
  - No statistically significant difference

# Limitations

- Only 4 weeks of data for each intervention
- Small, specific sample
- Large standard deviation
- Relied on self-reporting for daily session results
  - Worksheet – relied on students to cover while copying
  - iPad – relied on students to copy score correctly

# Take Away Message

The Flashcards Deluxe app on iPads was as effective as the cover-copy-compare worksheet intervention for increasing math fact fluency.

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# Questions

- Please contact
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