Learning with Measure Up!

An Efficacy Study of PBS KIDS’ Measure Up! and Super Vision Apps

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CRESST Conference
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## Co-Contributers & Collaborators

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10/10/18
Ready to Learn (RTL) Grant

- Department of Education funded, 5-year, $100M
- CPB, PBS KIDS, producers, local public media stations, researchers
- Advancing Children’s Learning Through Personalized Media Experiences (3rd grant cycle)
  - Funds new media content, multiplatform properties
- Focuses on low-income and underserved populations
- Measure Up! was created as part of the previous RTL cycle
Measure Up! App

- Measurement concepts
  - height/length, weight, capacity
- Preschool-aged children (3-to-5-year-olds)
“Measure Up!” App

- 3 “worlds,” one for each measurement domain
  - Videos
  - Games
  - Challenges
  - Toys
  - Interstitial content
“Super Vision” App

- Summary of games played, videos watched, content covered
- Suggestions for activities to build on media experiences
Research Questions

• RQ1: To what extent does playing Measure Up (MU), with parents provided (or not provided) the Super Vision (SV) app, impact children’s learning of measurement concepts?

• RQ2: Does parents’ use of the SV app lead to increases in parents’ awareness and support of their children’s learning of measurement concepts?

• RQ3: What is the gameplay behavior of children playing MU?
Design

- Pretest-posttest randomized design
  - Randomization within site
- Intervention took place at school
- Parents of children in the MUP+SV condition received loaner phones to use at home
- Intervention
  - 3 weeks, 4 days/week, 20-30 minutes of game play per occasion

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
</tr>
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<tbody>
<tr>
<td>Control (Super Why)</td>
<td>33</td>
</tr>
<tr>
<td>MU</td>
<td>33</td>
</tr>
<tr>
<td>MU + SV</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
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Sample and Setting

Sample criteria
• Attending low SES schools
• Aged 4 to 5 years
• Have parents who read English

Setting
• 4 school sites
  • 3 public Title I schools (3 preschool classes, 2 transitional kindergarten classes)
  • 1 childcare center at community college (two classes)
Measurement Assessment Development

• Child Math Assessment (CMA) (4 items)
• KeyMath-3 (3 items)
• CRESST developed (13 items)
  • 3 rounds of usability trials
  • Consultation with Alice Klein (CMA creator, early math expert)
• Concepts, practices came directly from the PBS KIDS math framework, reflected those found in the games and videos in the app
Measurement Assessment Design

- One-on-one administration (with observer)
- 10 minutes
- 20 items
  - Manipulables (10 items)
  - Pictures (6 items)
  - iPad Pan Balance app (4 items)
- Pre and post intervention
Measurement Assessment: Length/Height

11 Items
- Direct comparison
- Seriation
- Nonstandard measurement
Measurement Assessment: Capacity

3 Items
- Direct comparison
- Displacement
Measurement Assessment: Weight

6 Items
- Pan balance
- Direct comparison
- Nonstandard measurement

10/10/18
Parent Measures

- Parent surveys, pre and post (whole sample)
  - Background/demographics, media usage, character familiarity
- Parent questionnaires, weekly (MUP+SV)
  - SV use, helpfulness, technical issues
Analysis – RQ 1

RQ1: To what extent does playing Measure Up (MU), with parents provided (or not provided) the Super Vision (SV) app, impact children’s learning of measurement concepts?

• Ordinary Least Squares regression
• Predict posttest scores
• Control for pretest
• Include variable for condition (MU or MU+SV, reference group: control)
• Include covariates (gender, SES, age, school site)
### Results – RQ1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
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<tbody>
<tr>
<td>Pretest</td>
<td>0.873***</td>
<td>0.943***</td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
<td>(0.086)</td>
</tr>
<tr>
<td>MU-only</td>
<td>2.268***</td>
<td>1.763**</td>
</tr>
<tr>
<td></td>
<td>(0.595)</td>
<td>(0.659)</td>
</tr>
<tr>
<td>MU+SV</td>
<td>1.752**</td>
<td>1.606*</td>
</tr>
<tr>
<td></td>
<td>(0.588)</td>
<td>(0.653)</td>
</tr>
<tr>
<td>Constant</td>
<td>6.710</td>
<td>6.616</td>
</tr>
<tr>
<td></td>
<td>(3.828)</td>
<td>(4.180)</td>
</tr>
<tr>
<td>Observations</td>
<td>99</td>
<td>86</td>
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<tr>
<td>$R^2$</td>
<td>0.735</td>
<td>0.739</td>
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Model 1
- Pretest score
- Site
- Age
- Gender

Model 2
- Pretest score
- Site
- Age
- Gender
- Low-income
Results – RQ1

- Statistically significant effect of treatment groups as compared with the control condition
  - 11% gain for MU group
  - 9% gain for MU+SV group
- No significant difference between MU and MU+SV
- Sub scores estimated with hierarchical linear regression models: **children gained most on weight items**
Analysis & Results – RQ2

RQ2: Does parents’ use of the SV app lead to increases in parents’ awareness and support of their children’s learning of measurement concepts?

- Analysis: Qualitative analysis of survey responses from parents in MU+SV (n=30)
- Results:
  - 50% of parents said SV led to talking with children
Analysis – RQ3

RQ3: What is the gameplay behavior of children playing MU?

• Telemetry data
• Descriptives: time spent, error rates, bounce rate, time spent over course of study
• Misconception measures
Results – RQ3

Share of time spent by activity over the course of the intervention
Results – RQ3

Bounce Rate: rate at which children exit games

- **Air Show**
- **All Star Sorting**
- **Bubble Bath**
- **Chow Time**
- **Crystals Rule**
- **Dino Dive**
- **Happy Camel**
- **Leaf Leader**
- **Pan Balance**

Legend:
- No Clicks
- Some Clicks / No Attempts
- Some Attempts / No Successes
- Some Successes / No Rounds Completed
- Some Rounds Completed
- Finished Session
Results – RQ3

Error Rate: Average number of errors per round for games and challenges