Summary of Research on onebillion’s Learning Software

A Substantial Body of Rigorous Evidence

At least nine randomized controlled trials (RCTs) have been conducted on onebillion’s learning software in different countries, languages, and settings (e.g., in school, out of school, and refugee camps). These RCTs have consistently shown that onebillion’s software produces positive and significant learning gains in literacy and numeracy. The attached Table 1 summarizes key details of these studies.

Imagine’s Research

Imagine Worldwide conducted five of the nine RCTs mentioned above; detailed results are presented in Table 2. We built upon the early proof-of-concept RCTs conducted by the University of Nottingham over 8 weeks and 14 weeks to investigate whether the observed short-term impacts would be sustained over longer periods of time (i.e., over 8 months and over 2 school years). Imagine’s interest is not just in producing a statistically significant increase in learning that might translate into a few more letters, words, or numbers, but ultimately in helping children to become readers and to attain a similar skill level in mathematics (i.e., attaining end of 4th-grade standards). We also sought to test whether the tablet program could produce positive learning impacts in refugee settings, which include some of the most marginalized children. Finally, we replicated studies conducted in Malawi, in government schools and a refugee camp, in Tanzania. Over 4 years, our RCTs used three different versions of onebillion’s software, with results indicating increasing impacts with successive software versions. Further, our studies to date have shown that girls benefit at least as much as boys through the tablet program.

Although average efficacy impacts have been consistently positive and significant, we also found that a substantial proportion of learners remained non-readers despite using onebillion’s software. About 40% of learners in both the Global Learning XPrize RCT and Imagine’s 2-year RCT remained non-readers after using the tablet program for 15 months and 13 months, respectively. Being a “non-reader” means not being able to read a single word of connected text (that is, text presented as sentences in a paragraph). To understand factors influencing non-progress in reading, we conducted an initial exploratory study that showed that children’s visual working memory skills uniquely predicted high versus low progress in reading over and above some other known predictors of early literacy development (such as home literacy and learning environment and age). We investigated instructional strategies that have been shown to be effective in addressing working memory deficits, and shared these with onebillion to inform software improvements.
As we conclude our initial efficacy research phase, we are now focusing our research on supporting continuous improvement--of the software and of implementation practices in the field. We will be extending our research on non-progress in reading during the next couple of years and will conduct additional research to understand better for whom the software is working, for whom it is not, and why. We are also conducting implementation research to understand barriers to and enablers of quality program implementation as we expand.

**Research Reports and Presentations**

Imagine’s studies have met rigorous design and analysis standards. Our studies were shaped and reviewed by our founding research advisory group of highly respected experts as well as by our research partners. All of our RCTs have met baseline equivalence standards for the final analytic samples, supporting the causal validity of the findings.

**Imagine’s Research**


**Selected Additional Research**

- Outhwaite et al. (2017). “Closing the gap: Efficacy of a tablet intervention to support the development of early mathematical skills in UK primary school children.” Available [here](#).
- Outhwaite et al. (2019). “Raising Early Achievement in Math with Interactive Apps: A Randomized Control Trial.” Available [here](#).
<table>
<thead>
<tr>
<th>RCT Brief Name</th>
<th>Research</th>
<th>Year concluded</th>
<th>Country</th>
<th>Setting</th>
<th>Treatment duration</th>
<th>Target Pop.</th>
<th>Software version*</th>
<th>Subject</th>
<th>Language</th>
<th>Daily Dosage</th>
<th>Effect sizes (statistically significant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Proof of Concept Math</td>
<td>U Nottingham</td>
<td>2013</td>
<td>Malawi</td>
<td>In school</td>
<td>8 weeks</td>
<td>Grades 1-3</td>
<td>Proc. v1</td>
<td>Math</td>
<td>Chichewa</td>
<td>1 hour/day</td>
<td>Overall math = .63</td>
</tr>
<tr>
<td>2 Proof of Concept Literacy</td>
<td>U Nottingham</td>
<td>2017</td>
<td>Malawi</td>
<td>In school</td>
<td>14 weeks</td>
<td>Grades 1-3</td>
<td>Proc. v1</td>
<td>Literacy</td>
<td>Chichewa</td>
<td>1 hour/day</td>
<td>Overall literacy = .42</td>
</tr>
<tr>
<td>3 8-month RCT</td>
<td>Imagine</td>
<td>2019</td>
<td>Malawi</td>
<td>In school</td>
<td>8 months</td>
<td>Grade 2</td>
<td>Proc. v1</td>
<td>Literacy or Math</td>
<td>Chichewa</td>
<td>40 min/day</td>
<td>Early literacy = .34</td>
</tr>
<tr>
<td>4 Global Learning XPrize</td>
<td>RTI</td>
<td>2019</td>
<td>Tanzania</td>
<td>Out of school</td>
<td>15 months</td>
<td>9-11 year-olds</td>
<td>Community</td>
<td>Literacy &amp; Math</td>
<td>Swahili</td>
<td>Unlimited</td>
<td>Math various = .56 - 1.09, Literacy various = .32 - .95</td>
</tr>
<tr>
<td>5 Refugee Camp Math RCT</td>
<td>Imagine</td>
<td>2020</td>
<td>Malawi</td>
<td>Refugee camp - informal school</td>
<td>5 months</td>
<td>Preschool 3-5</td>
<td>Proc. v1</td>
<td>Math</td>
<td>English</td>
<td>20 min/day</td>
<td>Early math = .36</td>
</tr>
<tr>
<td>6 Multi-country Study</td>
<td>U Nottingham</td>
<td>2021</td>
<td>Ethiopia, Kenya, Malawi</td>
<td>In school</td>
<td>12 weeks</td>
<td>Grade 1</td>
<td>Proc. v1</td>
<td>Math</td>
<td>Multiple</td>
<td>30 min/day</td>
<td>Overall math = .28 - .39</td>
</tr>
<tr>
<td>7 2-year RCT</td>
<td>Imagine</td>
<td>2021</td>
<td>Malawi</td>
<td>In school</td>
<td>13 months</td>
<td>Grades 2-3</td>
<td>Proc. v2</td>
<td>Literacy or math</td>
<td>Chichewa</td>
<td>40 min/day combined</td>
<td>Overall math = .54, Overall literacy = .37</td>
</tr>
<tr>
<td>8 Refugee Camp RCT</td>
<td>Imagine</td>
<td>2022</td>
<td>Tanzania</td>
<td>Summer break</td>
<td>8 weeks</td>
<td>Grades 1-3</td>
<td>Adaptive v1</td>
<td>Literacy &amp; math</td>
<td>Swahili</td>
<td>40 min/day combined</td>
<td>Overall math = .44, Overall literacy = .20</td>
</tr>
<tr>
<td>9 5-month RCT</td>
<td>Imagine</td>
<td>2022</td>
<td>Tanzania</td>
<td>After school</td>
<td>5 months</td>
<td>Grades 1-3</td>
<td>Adaptive v1</td>
<td>Literacy &amp; math</td>
<td>Swahili</td>
<td>40 min/day combined</td>
<td>Overall math = .26, Overall literacy = .34</td>
</tr>
</tbody>
</table>

* "Procedural v1" was the original self-paced version; v2 had more content. "Community" was created for XPrize. "Adaptive v1" had the same content as Procedural v2 but used diagnostic tests to deliver content at the right level.

References:
5. Levesque, Bardack, Chigeda, and Winiko. Presentation at CIES 2021. Presentation available on request.
8. Levesque, Chigeda, Mguima, Bardack, Bahibi, Diazgranados (forthcoming). Details available on request.
9. Ibid.
### Table 2. Imagine RCTs of onebillion’s software: Impact results

<table>
<thead>
<tr>
<th>Setting</th>
<th>Government primary schools</th>
<th>Refugee camp schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study #</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCT short name</td>
<td>8-month</td>
<td>2-year</td>
</tr>
<tr>
<td>Number of schools in study</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of learners in study(1)</td>
<td>674</td>
<td>578</td>
</tr>
</tbody>
</table>

### Intervention description

- **Country**: Malawi, Malawi, Tanzania, Malawi, Tanzania
- **School authority**: Government, Government, Government, Private, Private
- **Software version(2)**: Proc. v1, Proc. v2, Adaptive v1, Proc. v1, Adaptive v1
- **Intervention duration**: 8 months, 13 months, 5 months, 5 months, 8 weeks
- **Implementation model**: School day, School day, After school, School day, School break
- **Software language**: Chichewa, Chichewa, Kiswahili, English, Kiswahili
- **Subject(s)**: Read or Math, Read or Math, Read + Math, Math only, Read + Math
- **Daily tablet usage time**: 40 min, 40 min, 40 min, 20 min, 40 min

### Literacy impact results

**Intent-to-Treat**

- **Effect size for overall literacy (EGRA average % correct)**: 0.34*, 0.37*, 0.34**, --, 0.20+
- **% added value(3)**: 66%, 32%, 51%, --, 56%
- **Added value in weeks or months(4)**: 5.3 mos, 4.2 mos, 2.6 mos, --, 4.5 wks
- **Rate of advancing on reading benchmark vs. control**: 1.50x, 1.50x, 1.80x, --, 1.53x
- **% of treatment group attaining emergent or fluent status**: 9%, 29%, 11%, --, 12%

**Treatment-on-the-Treated**

- **Percent of treatment group attending at least 50% of time**: 88%, 77%, 71%, --, 67%
- **Effect size (s.d.’s) - EGRA average % correct**: 0.40*, 0.47*, 0.49**, --, 0.29+

### Mathematics impact results

**Intent-to-Treat**

- **Effect size for overall math (EGMA average % correct)**: 0.07(5), 0.54**, 0.26*, 0.02(5), 0.44***
- **% added value(3)**: 7%, 28%, 67%, 5%, 239%
- **Added value in weeks or months(4)**: 0.6 mos, 3.6 mos, 3.4 mos, 0.2 mos, 19 wks
- **Rate of advancing on math benchmark vs. control**: 1.40x, 1.40x, 1.92x, 1.30x, 1.14x
- **% of treatment group attaining emergent or fluent status**: 19%, 72%, 12%, 46%, 79%

**Treatment-on-the-Treated**

- **Percent of treatment group attending at least 50% of time**: 88%, 83%, 71%, 70%, 67%
- **Effect size (s.d.’s) - EGMA average % correct**: 0.07, 0.65***, 0.37*, 0.03, 0.65***

---

*Statistically significant at p<0.10 level, * at p<0.05 level, ** at p<0.01 level, and *** at p<0.001 level.

(1) Studies 1 & 2 each had two treatment groups (literacy and math) and one control group resulting in three groups of (roughly) equal size, while studies 3-5 each had one treatment group and one control group of (roughly) equal size.

(2) "Procedural v1" was the original self-paced version; v2 had more content. "Adaptive v1" had the same content as Procedural v2 but used diagnostic tests to deliver content at the right level.

(3) % added value is derived by dividing the treatment effect by the control group effect. Control group effects = (average control group post-test minus the average control group pre-test) divided by the average standard deviation of the pre- and post-test scores.

(4) Added value in terms of weeks or months is derived by multiplying the % added value by the number of weeks or months of the intervention.
Math effect sizes for Studies 1&4 were originally calculated for number sense skills only, due to the limited math content of Procedural v1. For comparison purposes, the same math outcome measure is used here across all studies (i.e., overall EGMA average % correct).