Quick examples of successful research
Auburn Schools (ME) iPad K-3 Program

- District-wide 1:1 iPad program
- Identified need to increase student literacy and language acquisition by grade 4
- Spring 2011 pilot
- Fall 2011 Randomized pre/post study on 1st year kindergarten implementation (12 weeks)
- Multi-year longitudinal on ELA/Math outcomes
Auburn Schools Early Literacy Measures

- Rigby Benchmark Assessment
- Children’s Progress Academic Assessment
  - Phonics/Writing Test (PW)
  - Listening Test (List)
  - Phonetic Awareness Test (PA)
  - Reading Test (Read)
- Observation Survey of Early Literacy Achievement
  - Letter Identification (LetID)
  - Concepts about Print (CAP)
  - Word Reading/Ohio Word Test (OWR)
  - Writing Vocabulary (WV)
  - Hearing and Recording Sounds in Words (HRSIW)
  - Text Reading
<table>
<thead>
<tr>
<th>Kindergarten APPS:</th>
<th>Listening</th>
<th>Phonemic Awareness</th>
<th>Phonics/Writing Mechanics</th>
<th>Reading</th>
<th>Writing</th>
<th>Uses spaces between words</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Alphabet Touch*</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABC Magic 3 Preschool University</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABC Magnetic Land</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABC's and Me</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alphabet Car</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish HD</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I Like Books*</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Little Matchups ABC Alphabet*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Reader*</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Sky Writers</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Little Speller*</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Magic Reading 1 Preschool U.</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Montessori Crosswords</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sight Words*</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Spelling Magic ABC 1 Preschool U.</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Story Buddy</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Story Chimes</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Teach Me Kindergarten</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>White board/drawing app</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(Paint Sparkles)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Word Wall HD</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Word Wizard</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zaner Bloser</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Children are prompted to choose a letter from a group of letters on the screen.**

- ABC Alphabet Touch offers letter-picture matching and picture-picture matching based on initial sounds.
- ABC Magnetic Land provides an interactive magnetic letter board. Letters are identified by name when touched.
- ABC's and Me provides letters, corresponding picture, and word.
- Alphabet Car pronounces letters, sound, and word.
- Fish HD drives a bus to bump letters on the screen into word boxes. Highly interactive and engaging.
- I Like Books includes 36 "I Like..." books that are read aloud. Highlighted words. Options for reading to self and/or recording text.
- Little Reader consists of letter sorts and letter matching (upper/lower case). Letter names are read aloud.
- Little Speller identifies by name and read aloud. Customizable.
- Magic Reading 1 Preschool U. has three word activities: blending, segmenting, and reading.
- Montessori Crosswords allows students to pick the correct word from 4-5 choices. It is fully customizable. You can add/delete word lists.
- Spelling Magic ABC 1 Preschool U. provides a phonetic letter board for open-ended activities.
- Story Buddy allows students to spell words using a phonetic alphabet board. App provides a phonetic letter board for open-ended activities.
- Teach Me Kindergarten offers spelling and sight word practice along with math activities.
- White board/drawing app allows students to drop words into boxes to form words.
- Word Wall HD moves phonetic alphabet board where you can create words/sentences that are read back to the students.
- Word Wizard provides instruction on every letter through videos, tracing, and hints. Aligned with APH handwriting curriculum.
Auburn Schools (ME) iPad K-3 Program

- Rigby
  - iPad: 0.86
  - Comparison: 0.62

- PW
  - iPad: 0.97
  - Comparison: 0.91

- List
  - iPad: 0.71
  - Comparison: 0.69

- PA
  - iPad: 0.46
  - Comparison: 0.37

- READ
  - iPad: 0.88
  - Comparison: 0.84

- CAP
  - iPad: 6.26
  - Comparison: 5.91

- LetID
  - iPad: 15.68
  - Comparison: 15.44

- OWR
  - iPad: 2.51
  - Comparison: 2.09

- WV
  - iPad: 9.26
  - Comparison: 8.99

- HRSIW
  - iPad: 11.58
  - Comparison: 13.72
Time to Know (T2K) Study
PS-- Brownsville, Brooklyn

- Highest concentration of public housing in US
- 724 students

Pre/Post Comparison Design Study Outcomes:
- Student engagement
- Student retention
- Student achievement
- Digital Citizenship

1:1 laptop and Digital teaching platform across 4th and 5th grade
Compared to past averages and those students in the non-1:1 Brooklyn setting, 1:1 students exhibited a statistically significant difference of nearly six school days in the number of missed school days during the 2010/2011 school year.
T2K Study Outcomes

• 79% of students reported more engagement in class.
• Increase in variety of instructional strategies/resources employed by teachers
• Skype partnership with middle-eastern schools
T2K Study Outcomes
Think about your 4th grade classroom.
In the space below, draw a picture of yourself learning English in school.
5 minute individual activity

“Think about your ideal school or classroom setting.

Draw a picture of students learning in this setting.”
Drawing on Education

• Used for centuries as a means for children to express themselves

• The drawing prompt can be customized to address a wide variety of student and teacher experiences/perceptions

• Many empirical approaches:
  – Can used for descriptive, comparative, or longitudinal purposes
  – Holistic analyses /reflection exercise/PD
  – Emergent analytic coding
    Dichotomously code features of samples of drawings
Examples of student drawing prompts

- Draw a picture of yourself learning Math.

- Think about the teachers and the kinds of things you do in your classrooms. Draw a picture of one of your teachers working in his or her classroom.

- Think about the teachers and the kinds of things you have done in your class today. Draw a picture of your teacher teaching and yourself learning.

- Draw a picture of yourself taking the “big test”

- Think about the math work and activities you do outside of school. Draw a picture of yourself learning math outside of school.

- Draw a picture of yourself doing your homework.
Coding drawings

**Holistic Coding**

Assemble packet of drawings/text
Provide teams time to answer these questions:
1. What patterns do you see in the drawings?
2. Why do you think these patterns occur?
3. What do you think might be done differently in your school as a result of what you see in the drawings?

**Trait Coding**

Identify 1 trait
Establish a scale for the degree that trait is present (1-5)
Rate the degree each drawing/text exhibits that trait

**Emergent Analytic Coding**

www.drawingonmath.org
Developing Emergent Codes for student drawing rubric

Objective
Reliable/consistent
Dichotomous features
Quantitative summary
(allows for potential comparison)

For example, 55 independent codes created for “Draw a picture of your math class”
Using drawings as a data source:

1) identify your prompt
2) develop operational definitions
3) code each drawing

### Student characteristics

<table>
<thead>
<tr>
<th>At desk</th>
<th>Student is depicted seated and/or working at a desk.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working with pencil</td>
<td>Student is depicted working using a pen or pencil.</td>
</tr>
<tr>
<td>Working with laptop</td>
<td>Student is depicted working with a laptop computer.</td>
</tr>
<tr>
<td>Working with iPad</td>
<td>Student is depicted working with an iPad.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thinking</th>
<th>Student is depicted thinking (thought bubbles, light bulb, &quot;Oh, I get it&quot;, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>Student is depicted reading a book or reading from a screen.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Talking with teacher</th>
<th>Words (or some indication of communication) are depicted between at least one student and a teacher.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking with other student</td>
<td>Words (or some indication of communication) are depicted between one or more students.</td>
</tr>
</tbody>
</table>

### Technology present

<table>
<thead>
<tr>
<th>Laptop computer</th>
<th>Laptop computer is depicted anywhere in the drawing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPad</td>
<td>iPad device is depicted anywhere in the drawing.</td>
</tr>
<tr>
<td>Paper</td>
<td>One or more pieces of paper are depicted anywhere in the drawing.</td>
</tr>
<tr>
<td>Pencil</td>
<td>A pencil is depicted anywhere in the drawing.</td>
</tr>
</tbody>
</table>

| Interactive Whiteboard | An interactive whiteboard (Smartboard, etc) is depicted anywhere in the drawing. |

### Other

<table>
<thead>
<tr>
<th>Other students present</th>
<th>More than a single student is depicted.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher at front of room</td>
<td>Teacher is clearly depicted in drawing in the front of classroom (identifiable by size, label, or other characteristic).</td>
</tr>
<tr>
<td>Teacher with students one or more students</td>
<td>Drawing contains depiction of teacher working alongside one or more students</td>
</tr>
</tbody>
</table>
Shared Cart Class Drawing

Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school.
Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school:
Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school:
Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school.
1:1 Class Drawing (1)

Think about the work you do in your classroom. In the space below, draw a picture of yourself *writing in school*.
Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school.
1:1 Class Drawing (3)

Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school:
Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school:
Think about the work you do in your classroom. In the space below, draw a picture of yourself writing in school.
Example of coded drawing results

<table>
<thead>
<tr>
<th>Resources used in writing</th>
<th>Shared laptop classes</th>
<th>1:1 laptop classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop</td>
<td>9%</td>
<td>92%</td>
</tr>
<tr>
<td>Paper</td>
<td>87%</td>
<td>8%</td>
</tr>
<tr>
<td>Pencil</td>
<td>76%</td>
<td>7%</td>
</tr>
</tbody>
</table>
Example Results: Math Coach Drawing

- Students in small groups/desks in clusters: 60%
- Teacher present: 100%
- Small group instruction: 33%
- Whole class instruction: 60%
- Teacher Desk: 73%
- Smartboard/Whiteboard Projector: 53%
- Student technology: 27%
- Manipulatives/blocks/hands-on math tools: 13%
- Books/paper/pencil/student boards: 20%
- Games: 27%
- Rug/carpet: 40%
- Stations/centers around classroom: 27%
Examples of Student's Math Drawings

A picture is worth a 1,000 words. Here are some examples of student classroom drawings collected from elementary and middle school classrooms across the United States. Click on the images to see the full drawing.
Data is everywhere, and can be simpler than you realize!

Think about your 3rd grade classroom. In the space below, draw a picture of yourself learning English in school.
Think about your 3rd grade classroom.
In the space below, draw a picture of yourself learning English in school.