Use of Tablet PCs and C-Print® to Support Deaf and Hard-of-Hearing Students in General Education Classes

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Overview[1]

- Background
- Study Results
- Implications for Practice– Teachers
- Q & A

1. The project team included Lisa Elliot, Pamela Francis, Anne Alepoudakis, and Donna Easton

Background

"Evaluation of Use of Tablet PCs and C-Print to Support Deaf and Hard-of-Hearing Students"- "Evaluation Study"

- US Department of Education, #H327A070085
  - Steppingstones of Technology for Individuals with Disabilities
- September 2007-August 2011
- Pilot study, US Department of Education, #H327A0500064, September 2005-August-2008

What is C-Print?

A support service option for access and communication.

What is C-Print?, continued…

- Provides a text display of spoken information in real time for individuals who cannot hear (or individuals who process auditory information indirectly)
- Meaning-for-meaning translation
- Can be used by itself or with another accommodation
- Provides access to information during class and notes afterward

Goal

Evaluate C-Print Tablet software options:

- Real-time note taking
- Captioning with graphics

Objectives: Evaluation Study

- Determine effectiveness of using two tablet options for supporting students
- Examine additional factors, such as motivation, that may contribute to the effectiveness of the options
- Additional goals
  - Provide materials and guidance for implementation
  - Monitor and evaluate the fidelity of implementation of procedures for using the two options

Study Design

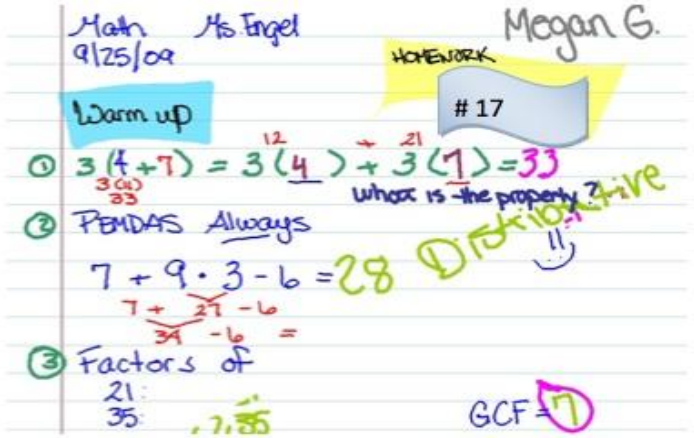
- Randomized, counterbalanced, control group design
- 3 study groups:
  - Real-time note taking (n=31)
  - Captioning with graphics (n=31)
  - Control group (regular IEP) (n=31)
- 4 states:
  - California (n=25)
  - Massachusetts (n=20)
  - New York (n=36)
  - Pennsylvania (n=12)

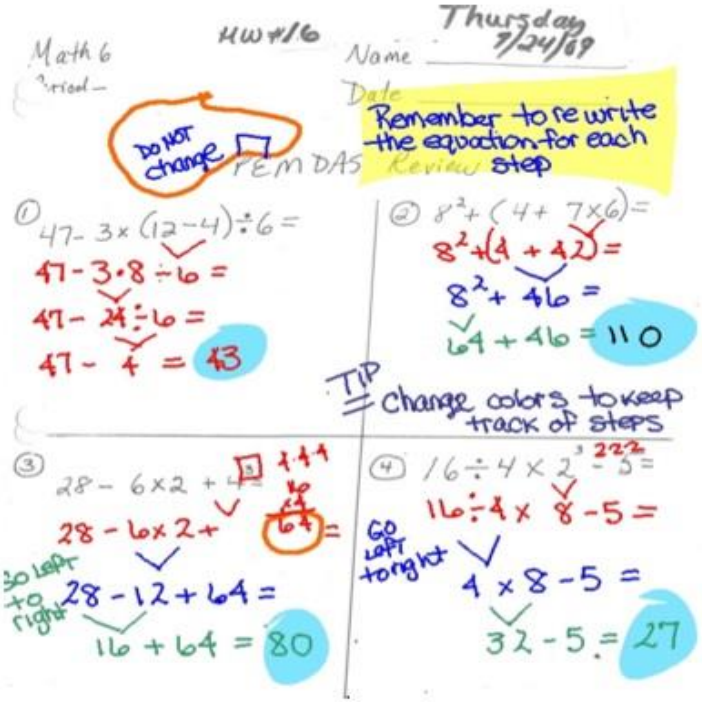
Study Design - Procedure

- Pre-trial meeting with classroom teachers and students
- 5-week classroom trial
  - Real-time note taking
  - Captioning with graphics
- Data collection
  - Student Experiences
  - Teacher Ratings (Counterbalanced design; some teacher ratings before trial, some 5 weeks after trial)
- Experiment – simulated lecture (individual students; all groups)

Real-time Note taking

- Class notes CO-AUTHORED by notetaker and student on individual tablets
- Real-time display
- Edited and distributed by e-mail or hard copy

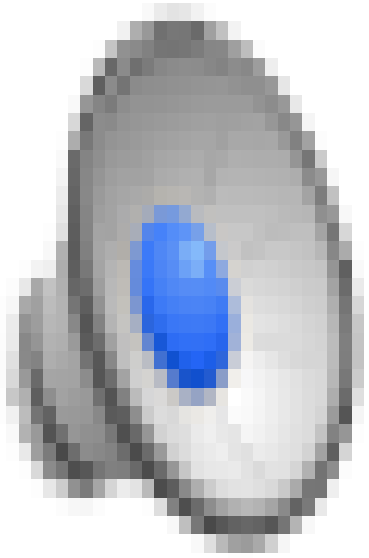

Math Ms Engel
9/25/09
Megan G.
HOMEWORK
17
Warm up
① 3(4+7) = 3(4) + 3(7) = 33
12 21
3(11) 33
which is the property? Distributive
② PEMDAS Always
7 + 9 · 3 - 6 = 28
7 + 27 - 6
34 - 6 =
③ Factors of
21:
35:
GCF = 7


HW #16
Thursday 7/24/09
Math 6
Name
Date
Do not change
Remember to re write the equation for each step
PEMDAS Review
① 47 - 3x(12-4)÷6 =
47 - 3·8 ÷6 =
47 - 24 ÷6 =
47 - 4 = 43
② 8² + (4 + 7x6) =
8² + (4 + 42) =
8² + 46 =
64 + 46 = 110
TIP
Change colors to keep track of steps
③ 28 - 6x2 + 4² =
1 1 1
16
64
28 - 6x2 + 64 =
Go left to right
28 - 12 + 64 =
16 + 64 = 80
④ 16 ÷ 4 x 2³ - 5 =
2 2 2
16 ÷ 4 x 8 - 5 =
Go left to right
4 x 8 - 5 =
32 - 5 = 27

Captioning with Graphics

- Traditional C-Print, with a twist!
- Use tablet PCs instead of standard laptops
- Includes graphics
- Graphics can be CO-AUTHORED

Captioning with Graphics Video



(Video not available.)

December 23, 2008
"A" Day
Math Mr. Shahin

[no homework

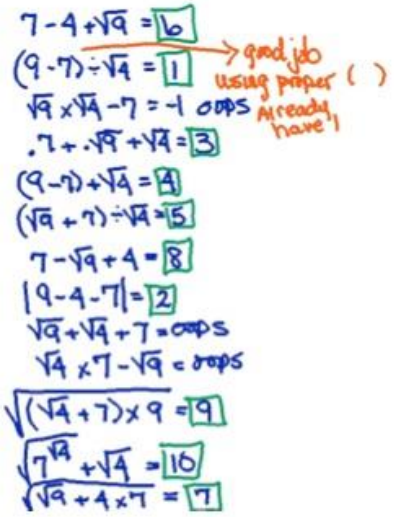
Bowling Pin Activity

4,7,9

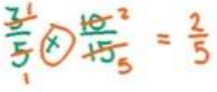
We will do the Secret Santa after lunch 5, 6.

Go to your regular 5th period class. This morning is a regular morning. We'll take attendance 5th period.

Okay raise your hand if you would like to knock down a pin.

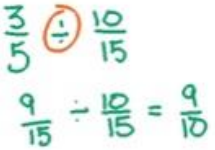


Today we will do a quick review of multiplying and dividing fractions



When we multiply we don't need to find a common denominator.

If this were dividing we would need to find a common denominator.



Additional software features

- Import PowerPoint slides
- Import Worksheets
- Templates
  - Graph paper
  - Notebook paper

Student Work

$y = mx + b$

Jared

Target y by itself

$12x + 3y = 9$ $-12x$

$-12x$

$3y = -12x + 9$ (1)

Then ÷ by 3 on both sides

$\frac{3y}{3} = \frac{-12x}{3} + \frac{9}{3}$

$y = -4x + 3$ (2)

yes used inverse

Molly

$12x + 3y = 9$ $-12x$

$-12x$

$3y = 9 - 12x$ (1)

$\frac{3y}{3} = \frac{9}{3} - \frac{12x}{3}$

$y = 3 - 12x$ (2)

No she needed to divide $-12x$ by 3

Ali

$12x + 3y = 9$ $-12x$

$-12x$

$4x + y = 3$ (1)

$y = -4x + 3$ (2)

$\frac{3y}{3} = \frac{9}{3} - \frac{12x}{3}$

$y = 3 - 4x$

Changed the format and made the equation to linear $y = mx + b$

Mia

$12x + 3y = 9$ $-12x$

$-12x$

$3y = 9 - 12x$ ✓ (1)

$y = 3 - 4x$ (2)

$y = 4x + 3$ (3)

No - she needed to move the signs with #s

* no sign means it's positive

HOMEWORK #37

Fundraising Project

Transparency 1.1 Thermometer

Monday 10/26/09

Problem 1.1

A)
- FALSE $100 is too low
- TRUE
- TRUE
- TRUE
- FALSE 50% would be half

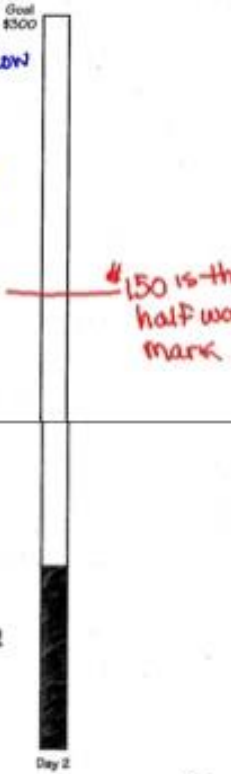
B) 1) _____ $150 is the half way mark

2) _____

C) 1) _____

_____

2) Draw and Shade the thermometer for Day 3



Applications

1. Mountview Middle School conducted the same type of fundraiser as Thurgood Marshall Middle School. The Mountview sixth-grade thermometer for Day 2 is shown at the right.
   a. Write three statements that the principal could make when reporting the results of the progress made by the sixth-graders.
   b. What are two claims that the sixth-graders could make if they collected $50 on the third day?
   c. Draw and shade a thermometer for Day 3.

2. a. What fraction strips could you make if you started with a fourths strip?
   b. If your teacher gave you an eighths strip like the one you made in Problem 1.2, which of the fraction strips you folded for Problem 1.2 would have more than one mark that lines up with the marks on the eighths strip?

Connections

20. Is 450 divisible by 5, 9, and 10? Explain.

21. Explain your answer to each question.
   a. Is 12 a divisor of 48?
   b. Is 4 a divisor of 150?
   c. Is 3 a divisor of 51?

22. **Multiple Choice** Choose the number that is not a factor of 300.
   A. 5 **B.** 6 **C.** 8 **D.** 20

23. **Multiple Choice** Choose the answer that shows all of the factors of 48.
   F. 2, 4, 8, 24, and 48 **G.** 1, 2, 3, 4, 5, and 6
   H. 48, 96, 144 **J.** 1, 2, 3, 4, 6, 8, 12, 16, 24, and 48

Research – Participants

Grade	Real-Time Note taking	Captioning with Graphics	Regular IEP	Total
4	1	1	1	3
5	2	0	2	4
6	6	5	3	14
7	5	4	2	11
8	5	3	8	16
9	4	4	4	12
10	4	5	4	13
11	3	6	5	14
12	1	3	2	6
Total	31	31	31	93

Data Collection – Teacher Ratings

- With and without tablet or at 5 and 10 week mark
  - Grade (percentage)
  - Academic achievement (1-5 scale, 1=much worse, 5=much better)
  - Learning new vocabulary (1-5 scale, 1=much worse, 5=much better)
  - Class participation (1-5 scale, 1=much worse, 5=much better)

Results – Teacher Ratings

	Grade with Tablet *M* (*SD*)	Grade without Tablet *M* (*SD*)
Real-time Note Taking (*n* = 31)	84.82 (6.79)	81.96 (10.99)
Captioning with Graphics (*n* = 27)	80.27 (13.05)	81.11 (13.43)
Regular IEP Control (*n* = 28)	78.59 (13.73)	79.36 (13.20)

Results - Teacher Ratings continued…

	Academic Achievement with Tablet (1 = Much Worse, 5 = Much Better) *M* (*SD*)	Academic Achievement without Tablet (1 = Much Worse, 5 = Much Better) M (SD)
Real-time Note Taking (*n* = 28)	3.57 (.74)	2.89 (.57)
Captioning with Graphics (*n* = 28)	3.36 (.68)	2.93 (.72)
Regular IEP Control (*n* = 28)	3.10 (.62)	2.90 (.56)

Results - Teacher Ratings continued…

	Learning New Vocabulary with Tablet (1 = Much Worse, 5 = Much Better) *M* (*SD*)	Learning New Vocabulary without Tablet (1 = Much Worse, 5 = Much Better) *M* (*SD*)
Real-time Note Taking (*n* = 27)	3.27 (.57)	3.07 (.62)
Captioning with Graphics (*n* = 27)	3.41 (.64)	2.78 (.71)
Regular IEP Control (*n* = 29)	3.10 (.56)	2.90 (.62)

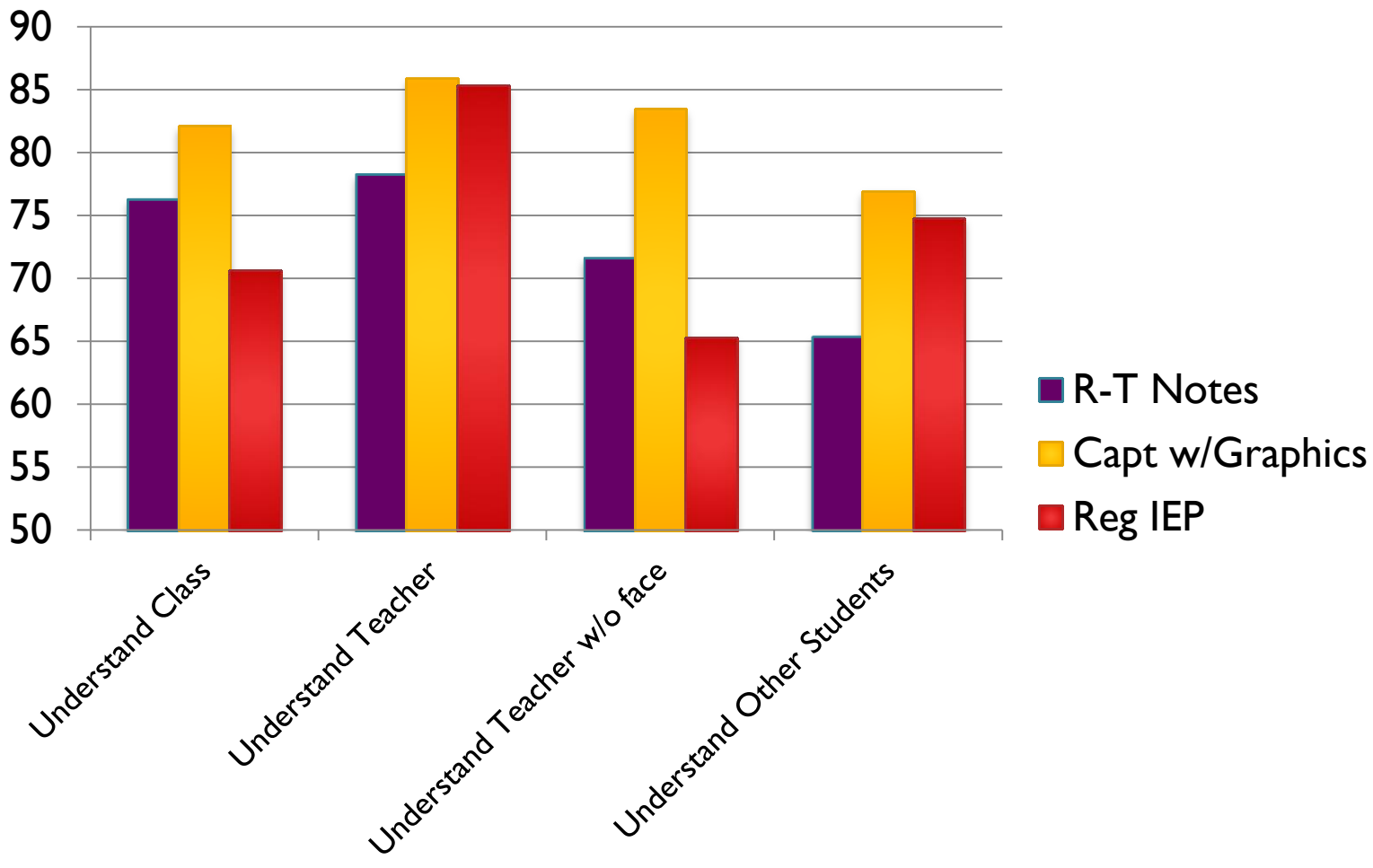
Results - Teacher Ratings continued…

	Class Participation with Tablet (1 = Much Worse, 5 = Much Better) *M* (*SD*)	Class Participation without Tablet (1 = Much Worse, 5 = Much Better) *M* (*SD*)
Real-time Note Taking (*n* = 28)	3.27 (.67)	2.93 (.60)
Captioning with Graphics (*n* = 28)	3.30 (.96)	2.79 (.92)
Regular IEP Control (*n* = 29)	3.17 (.54)	3.10 (.62)

Results – Student Comprehension Ratings

- Comprehension
  - Class (teacher, lessons, students)
  - Teacher
  - Teacher without seeing face
  - Other students

Results – Student Comprehension Ratings continued…



Results – Student Characteristics

- Motivation (1= strongly disagree, 5 = strongly agree for each item; scores summed—range 5-15)
  - It was important for me to learn a lot in this class
  - I was very interested in this class
  - I really worked hard in this class

Results – Student Characteristics continued…

- Motivation associated with TEACHER RATINGS:
  - Higher grade when using tablet (.58*)
  - Higher grade when NOT using tablet (.46)
  - Using equipment responsibly (.36)

*r , all shown, $p < .05$

- Motivation associated with STUDENT RATINGS:
  - Understanding class (.35*), understanding teacher (.34), understanding teacher without seeing teacher's face (.23)
  - Identifying important information during class (.32)
  - Using software (.39)
  - Finding the real-time display (.42), notes as helpful (.37)

*r , all shown, $p < .05$

Quotes from Pilot Study

- Determined feasibility and usability of technology
- Collected primarily qualitative information that included interviews with
  - Teachers
  - Students

Teacher Feedback

- *L was glued to the tablet. She was able to take better notes using it and seemed more comfortable with the content with the tablet. She said she understood things better and could follow what was going on in class better. While participation did not increase, her engagement in class did. She would frequently refer to it throughout class to show other students information or to back up an answer she gave.*

Teacher Feedback continued…

- *C seemed to be more engaged during class. Before using the tablet there were many times when he would be fighting (with himself) to stay awake, but this never happened while using the tablet!*

Student Feedback

- *Simple and easy to understand.*
- *They were very helpful for studying on tests.*
- *The notes are really really easy to read.*

Benefits to Educators

- *Regular Classroom Teacher*
  - C-Print notes a written record of class
    - Distribute to other students
    - Use to prepare lesson plans, tests, activities
  - Change perception of students' capabilities
- *TODs and Regular Classroom Teacher*
  - Better understanding of what has happened in class

Best Practices for Teachers

TOD and Regular Classroom Teacher

- Communicate regularly with captionist
- May use C-Print notes
- May encourage student to do note taking

Regular Classroom Teacher

- Provide materials to captionist in advance
- Allow student to use tablet instead of worksheet or notebook
- Work with student to decide who will introduce to class (or not)

CONTACT INFORMATION:

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C-Print website: http://www.ntid.rit.edu/CPrint/