



MISSOURI EOC ASSESSMENTS TAC MEETING

COG LABS, FIELD TRIAL, AND ADMINISTRATION

August 22, 2013



TOPICS

- ❑ Cog Labs
- ❑ SR Field Trial
- ❑ Tool Enhancements
- ❑ Administration

COG LABS

■ Purposes

- To gain insight into the cognitive process
- To identify construct-irrelevant factors

■ Think aloud/verbal protocol analysis

- Two-step process (Ericsson & Simon, 1993)
- Think aloud and retrospective interview

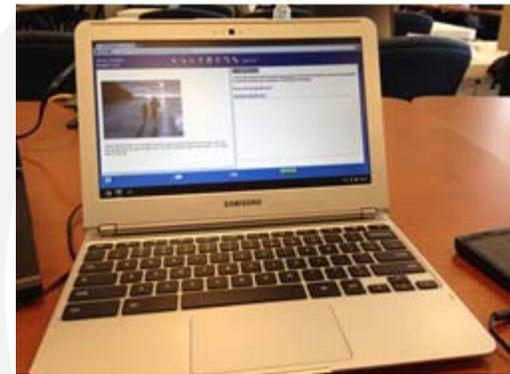
■ Recruitment for Participation

- Eligibility -- schools with iPads, Androids, or Chromebooks
- A state-wide email sent
- 9 districts responded and followed up with additional information and qualifications
- 5 schools participated based on their availability

PARTICIPATING SCHOOLS AND DEVICES



-  A = Android-ASUS
-  B = iPad
-  C = Chromebook
-  D = Android-HP
-  E = iPad



Samsung Chromebook
4

SAMPLE

Cog Lab	F	M	Total
Algebra I			
Android-ASUS	2	3	5
Android-HP	3	2	5
<u>Chromebook</u>	2	2	4
<u>iPad - School 1</u>	3	2	5
<u>iPad - School 2</u>	3	2	5
Total	13	11	24
Biology			
Android-ASUS	2	3	5
Android-HP	3	2	5
<u>Chromebook</u>	2	3	5
<u>iPad - School 1</u>	2	3	5
<u>iPad - School 2</u>	2	3	5
Total	11	14	25
English II			
Android-ASUS	2	3	5
Android-HP	2	3	5
<u>Chromebook</u>	1	3	4
<u>iPad - School 1</u>	3	2	5
<u>iPad - School 2</u>	3	2	5
Total	11	13	24
Grand Total	35	38	73

PROCEDURE

- ❑ Tests: Algebra I, English II, Biology
- ❑ Run by a subject matter expert (SME)
 - Introduction to the activity
 - Demonstration of the think-aloud process
 - Worked with each student on each item
 - Asked a series of questions at the completion of each item following the cog lab protocol
 - Asked students to take a survey at the completion of the last item
- ❑ 45-60 minutes per session
- ❑ May 6-16, 2013



SAMPLE SR ITEMS

Demo Student Algebra Cog Lab 11:05 AM 75%

Item 4 of 8

The graph of $y = 2x - 4$ is shown below.

4. If the slope of the line is doubled, the new equation is $y = 4x - 4$. Which of these is a correct comparison of the two lines?

- (A) The x-intercept and y-intercept change.
- (B) The x-intercept and y-intercept stay the same.
- (C) The x-intercept changes, and the y-intercept is the same.
- (D) The x-intercept is the same, and the y-intercept changes.

REVIEW

Demo Student Algebra Cog Lab 5:32 PM 58%

Item 2 of 8

A survey was administered to 500 high school students to determine the type of music they prefer. The survey indicated that 22% prefer rock, 26% prefer hip hop, 29% prefer pop, and 23% selected "other." Which representation best illustrates the number of students preferring each type of music?

2. Preferred Music

Type	Percent of Students
Rock	22
Hip Hop	26
Pop	29
Other	23

(A) Preferred Music

(B) Preferred Music

(C) Preferred Music

(D) Preferred Music

REVIEW

Demo Student Algebra Cog Lab 5:32 PM 58%

Item 3 of 8

A survey was taken asking participants their age and the number of minutes they exercise per week. The results of the survey are shown in the scatter plot below.

Minutes of Exercise per Week

Exercise per Week, in minutes

Age, in years

3. The data for people who are 30 to 39 years of age are not displayed. Based on the scatter plot, how many minutes would a 30- to 39-year-old person be expected to exercise?

- (A) 40–60 minutes
- (B) 60–80 minutes

REVIEW

Demo Student Biology Cog Lab 5:34 PM 58%

Item 4 of 8

The diagram below shows a food web.

4. A reduction in which of these would lead to a decrease in all the other populations in the web?

- (A) coyote
- (B) grass
- (C) grasshoppers
- (D) snake

REVIEW

SAMPLE PE/WP ITEMS

11:10 AM 74%

Demo Student
Biology Cog Lab

Item 7 of 8

Tiny Bubbles

Two students were doing an investigation in which they studied the effect of light intensity on the rate of photosynthesis of algae, an aquatic plant. To determine the rate of photosynthesis, they counted the number of bubbles of oxygen (O_2) produced in the water. The results of their experiment are shown in the data table.

Data Table 1

Light Intensity (Candelas)	Rate of Photosynthesis (Bubbles per Min)
0	0
400	1
800	2
1200	3
1600	4
2000	6
2400	6
2800	6
3200	6
3600	6
4000	6

7. Use the data from Data Table 1 to construct a line graph on the grid below.

Be sure to provide:

- an appropriate title
- labeled axes with appropriate units
- appropriate number scales
- correctly plotted data

Draw Eraser S. Eraser M. Add Text H. Add Text V.

REVIEW

5:33 PM 68%

Demo Student
Algebra Cog Lab

Item 7 of 8

7. Due to rising costs, a water district will raise its monthly charges. The current charge is a flat fee of \$15 plus \$0.01 for every gallon used. The district plans to keep the same flat fee but raise the rate to \$0.015 for every gallon used.

- Complete the table of charges below.

Number of Gallons of Water Used	Total Monthly Charge of Current Plan, in Dollars	Total Monthly Charge of New Plan, in Dollars
100	<input type="text"/>	<input type="text"/>
200	<input type="text"/>	<input type="text"/>
350	<input type="text"/>	<input type="text"/>
500	<input type="text"/>	<input type="text"/>
1120	<input type="text"/>	<input type="text"/>

- Write an equation to represent each monthly charge. Let C = cost and x = number of gallons of water used per month.

Current monthly charge equation:

$$C = 15 + 0.01x$$

REVIEW

1:43 PM 100%

missouri-demo.questarai.com/admin/pedemo/?sb=1

English Lab

3. Think of a career path you may choose as an adult. Write a business letter to an employer or a person working in that career field clearly explaining your interest in a job in the field, your future goals, and your reasons for believing you would be a strong candidate for a job.

Directions to the Student

After you finish your prewriting activity, write your paper in the space provided. You may use a standard dictionary, thesaurus, or grammar handbook to check your paper for correctness.

Please refer to the writer's checklist as you are writing your response to the prompt

Writer's Checklist

- My paper has an effective beginning, middle, and end.
- My paper includes effective use of paragraphing.
- My paper stays on the topic.
- My paper flows smoothly from one idea to another.
- My paper contains a strong controlling idea.
- My paper includes specific and relevant details, reasons, and examples.

Dear James

I would like to be a farmer when i become an adult. I think that i would be a strong candidate for this becuae i have grown up on a farm, i love animals and when i start doing something i do not quit until it is finished. I have always wanted to have a farm on my own. I feel i would be good at this because i love to do hands on work.

REVIEW

11:06 AM 76%

Demo Student
Algebra Cog Lab

Item 7 of 8

Graph the equations for the current charge and the new charge on the grid below. Label each equation.

Monthly Water Charges

REVIEW

STRUCTURE OF THE PROTOCOL DATA COLLECTED

	iPad	Android	Chromebook	Totals
Algebra I Cases	10	10	4	24
6 SR	60	60	24	144
2 PE	20	20-8	8	40
Biology Cases	10	10	5	25
4 SR	40	40	20	100
4 PE	40	40	20	100
English II Cases	10	10	4	24
2 SR	20	20	8	48
2 PE (WP)	20	20	8	48

Bold cell contents are counts of student-by-item observations.

RESULTS - DOES THE STUDENT SEEM CERTAIN OF THE PROCESS OF RESPONDING TO THE ITEM?

	Algebra I		Biology		English II		Totals	
	PE	SR	PE	SR	PE	SR	PE	SR
Yes	25	144	90	92	46	47	161	283
Unclear	8		2	1	2		12	1
No	7		7	3			14	3
(Missing)	8		1	4		1	9	5
Totals	48	144	100	100	48	48	196	292

Cell contents are counts of student-by-item observations on student level of certainty.

STUDENT PERCEPTION OF RELATIVE TASK DURATION, BY DEVICE

	Shorter on this Device	About the Same	Longer on this Device
iPad	22%	50%	29%
Android	19%	51%	29%
Chromebook	25%	62%	14%

Cell contents are row-percentages of student-by-item observations.

STUDENT PERCEPTION OF RELATIVE TASK DURATION, BY ITEM TYPE

	Shorter on this Device	About the Same	Longer on this Device
SR	26%	63%	11%
PE	15%	33%	52%

Cell contents are row-percentages of student-by-item observations.

STUDENT PERCEPTION OF RELATIVE TASK DIFFICULTY, BY DEVICE

	Easier on this Device	About the Same	Harder on this Device
iPad	31%	44%	25%
Android	25%	48%	27%
Chromebook	29%	63%	8%

Cell contents are row-percentages of student-by-item observations.

STUDENT PERCEPTION OF RELATIVE TASK DIFFICULTY, BY ITEM TYPE

	Easier on this Device	About the Same	Harder on this Device
SR	36%	57%	7%
PE	16%	36%	47%

Cell contents are row-percentages of student-by-item observations.

SURVEY RESULTS

Online Survey

Device	# of Survey Responses
Android	27
iPad	30
Chromebook	13
Total	70

TABLET POSITIONING AND ONSCREEN KEYBOARD

iPads and Androids

Tablet Positioning	Onscreen Typing Skills			
	Beginner	Intermediate	Advanced	Total
Lying flat	4	12	10	26
Propped up at an angle	9	18	3	30
Total	13	30	13	56

ONSCREEN KEYBOARD PREFERENCE IN LIGHT OF TYPING SKILLS

iPads and Androids

Onscreen Keyboard Typing Skills	Like Onscreen Keyboard or Not?		Total
	Yes	No	
Beginner	--	12	12
Intermediate	16	15	31
Advanced	8	5	13
Total	24	32	56

STYLUS

- 11 of 55 iPad and Android students reported using a stylus; 3 used it for the first time in the cog lab
- 34 students did not like styli, although 32 never used it before
 - Liked using hands and fingers
 - Easier and more natural
- 9 of 11 who used a stylus like it
 - Easier to “tap”, “point”, “control”
 - “Touch the right spot all the time”

TESTING EXPERIENCE IN THE COG LAB

“How easy was it to take a test on the tablet during the cog lab?”

School	Easy or Very Easy	Difficult	Total
iPad	23	7	30
Android	19	6	25
Chromebook	11		11
Total	53	13	66

“EASY” OR “DIFFICULT”

■ “Easy”

- Tablets
 - Convenient and faster
 - Easy to select a response for SR
 - iPad + external keyboard superior than a computer
- Chromebooks – simple and straightforward like a laptop

■ “Difficult”

- Technical issues from the tools: graphing, scrolling, typing, onscreen keyboard
- Tablet’s sluggish response

DEVICE PREFERENCES FOR MO EOC

If you take the MO EOC test, would you prefer to take it on a desktop/laptop computer or on a tablet?

School	Desktop /Laptop	Tablet	No Preference	Total
iPad	13	10	7	30
Android	16	7	4	27
Total	29	17	11	57

Chromebook

School	Desktop /Laptop	Chromebook	No Preference	Total
Chromebook		6	5	11

REASONS FOR CHOOSING DESKTOPS/LAPTOPS

- ❑ Easier, faster, more responsive, better for typing and scrolling
- ❑ No issues with tools (e.g., graphing)
- ❑ Typing on the onscreen keyboard was difficult
- ❑ Problems with the tablet used

“I noticed that the test was being given on an HP TouchPad running CyanogenMod. I really didn't expect this to be particularly stable, and it wasn't. I'm curious if the test would run better on a native Android tablet, running an official version of Android. I also think that the tablet version of Google's Chrome browser would perform much better.”

- A Biology student

REASONS FOR CHOOSING TABLETS

❑ *Faster and easier*

❑ *“On computers people could see all my answers and I do not like cheaters..also easier to type with”*

- An Algebra I student who used an iPad

❑ *“I would rather take it on a tablet because it is easier for me to stay in the test and it would show a better understanding on the graphs and stuff like that. And it would help kids in the future because everything is going to technology like this.”*

- A Biology student who used an Android

“TABLET PIONEERS”

Like Tablets?	Like Onscreen Keyboard?	Keyboard Preference	Device Preference when Taking the MO EOC Test			Total
			Desktop /Laptop	Tablet	No Preference	
Yes	Yes	Onscreen	5	7	4	16
		External	2	3	2	7
		Total	7	10	6	23

RECOMMENDATIONS

- Improvement of the tools
 - Graphing functionality
 - Scrolling
- Keyboard
 - Allow students to choose a keyboard
- Stylus
 - Allow students to use a stylus
 - Use a stylus designed for precision
 - Encourage students to do practice tests with a tablet and stylus

RECOMMENDATIONS (CONT.)

- Devices for MO EOC testing
 - Allow students to choose the device they have most experience with
 - Allow iPads and Androids to be used following a field trial of enhanced tools
 - Allow Androids to be introduced when problems associated with connectivity, loading speed, compatibility, and tool functionality are more fully investigated and resolves
 - Further screen Androids for EOC testing

SR FIELD TRIAL

OVERVIEW

- ❑ Held in Missouri schools May 15–16
- ❑ Supported tablets included iPads, Android tablets, and Chromebooks.
- ❑ Test lab setup was supervised by Questar.
- ❑ A 12-question test consisting of selected-response items only
- ❑ Two classes participated:
 - 24 students on iPads
 - 21 students on Chromebooks

RESULTS AND FINDINGS

- ❑ A school using Android tablets could not be identified.
- ❑ Guidance was required to set up the test labs.
 - iPad - Guided Access
 - Chromebook – Device-level Google accounts
- ❑ The testing system performed well.
- ❑ Wireless bandwidth may be insufficient; initial test time was slow for some students.

RESULTS AND FINDINGS (CONT.)

- ❑ Some students were not comfortable with the smaller screen.
- ❑ Students had difficulty using two-finger scrolling.
- ❑ Some tools (i.e., the highlighter, ruler, and protractor) were awkward to use.

CONSIDERATIONS AND RECOMMENDATIONS

- ❑ Secure test setup must be ensured.
- ❑ Sufficient network bandwidth must be provided.
- ❑ Students should be allowed to opt out of testing on tablets.

CONSIDERATIONS AND RECOMMENDATIONS

(CONT.)

- ❑ Scrolling technique and tools should be improved.
- ❑ Practice tests need to be more representative of the actual test.
- ❑ Students should be required to take practice tests.

TOOL ENHANCEMENTS

Demo Student
Biology Cog Lab

11:10 AM 74%

Item 7 of 8

Tiny Bubbles

Two students were doing an investigation in which they studied the effect of light intensity on the rate of photosynthesis of elodea, an aquatic plant. To determine the rate of photosynthesis, they counted the number of bubbles of oxygen (O_2) produced in the water. The results of their experiment are shown in the data table.

Light Intensity (Candelas)	Rate of Photosynthesis (Bubbles per Min)
0	0
400	1
800	2
1200	3
1600	4
2000	6
2400	6
2800	6
3200	6
3600	6
4000	6

7. Use the data from Data Table 1 to construct a line graph on the grid below.

Be sure to provide:

- an appropriate title
- labeled axes with appropriate units
- appropriate number scales
- correctly plotted data

Draw Eraser S Eraser M Add Text H Add Text M

Practice Test PE Tutorial
8 out of 8

9:20 AM 81%

Demo Test
Missouri EOC

Tiny Bubbles

Two students were doing an investigation in which they studied the effect of light intensity on the rate of photosynthesis of elodea, an aquatic plant. To determine the rate of photosynthesis, they counted the number of bubbles of oxygen (O_2) produced in the water. The results of their experiment are shown in the data table.

Light Intensity (Candelas)	Rate of Photosynthesis (Bubbles per Min)
0	0
400	1
800	2
1200	3
1600	4
2000	6
2400	6
2800	6
3200	6
3600	6
4000	6

8. The investigation was repeated with all the same conditions except for the water temperature. In the second investigation the water temperature was increased and the rate of photosynthesis (bubbles per minute) doubled.

Construct a new table for this second investigation displaying data for the new rate of bubble formation. Name this new table "Data Table 2."

Add Title Add Row Add Column Delete Row Delete Column

Pause Back Next Review

Practice Test PE Tutorial
8 out of 8

9:34 AM 80%

Demo Test
Missouri EOC

The investigation was repeated with all the same conditions except for the water temperature. In the second investigation the water temperature was increased and the rate of photosynthesis (bubbles per minute) doubled.

Construct a new table for this second investigation displaying data for the new rate of bubble formation. Name this new table "Data Table 2."

Light Intensity (Candelas)	Rate of Photosynthesis (Bubbles per Min)
0	0
400	1
800	2
1200	3
1600	4
2000	6
2400	6
2800	6
3200	6
3600	6
4000	6

this is a title

222	333	555
111	555	777
22	44	66

Pause Back Next Review

Practice Test PE Tutorial
4 out of 8

9:01 AM Not Charging

Demo Test
Missouri EOC

The graph of $y = 2x - 4$ is shown below.

4. If the slope of the line is doubled, the new equation is $y = 4x - 4$. Which of these is a correct comparison of the two lines?

A The x-intercept and y-intercept change.

B The x-intercept and y-intercept stay the same.

C The x-intercept changes, and the y-intercept is the same.

D The x-intercept is the same, and the y-intercept changes.

Pause Back Next Review

TOOL ENHANCEMENTS (CONT.)

Demo Student
Algebra Cog Lab

11:07 AM 75%

Item 7 of 8

Graph the equations for the current charge and the new charge on the grid below. Label each equation.

REVIEW

Practice Test PE Tutorial
7 out of 8

Demo Test
Missouri EOC

9:36 AM 79%

students were doing an investigation to find the effect of light intensity on the rate of photosynthesis of elodea, an aquatic plant. In the experiment, they counted the number of bubbles of oxygen (O_2) produced in the experiment. The data from the experiment are shown in the data table below.

Light Intensity (candelas)	Rate of Photosynthesis (Bubbles per Minute)
0	0
400	1
800	2
1200	3
1600	4
2000	6
2400	6
2800	6
3200	6
3600	6
4000	6

Pause Back Next Review

Demo Student
Algebra Cog Lab

11:06 AM 75%

Item 7 of 8

Graph the equations for the current charge and the new charge on the grid below. Label each equation.

REVIEW

Practice Test PE Tutorial
7 out of 8

Demo Test
Missouri EOC

9:08 AM Not Charging

New monthly charge equation:

Pause Back Next Review

2013 SUMMER ADMINISTRATION

Testing using new devices

Test	iPads	Chromebooks
English I	8	
Government	16	10
American History		23
Total	24	33