

Low-fi Prototype and Testing

...

click Education

Mission Statement: Never Leave Class Confused

Two perspectives:

- Student
 - Confused about lecture topics
- Teacher
 - Confused about student performance

Problem/Solution Overview

Problem:

- Students don't want to publicly admit that they don't understand class material, so teachers don't have a reliable means by which to determine their students' comprehension until it's too late.

Solution:

- Anonymous student feedback removes the participation barrier, enabling teachers to both revisit what was misunderstood in real-time and to update their lesson plans based on this information.

Overview of Talk

1. Brainstorming and picking between possible devices and UIs
2. Narrowing UI flow for each task
3. Constructing prototype for tasks and necessary functionality
4. User experimentation and feedback

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Possible UI choices

- Device choices
 - iPad vs. iPhone vs. Apple Watch vs. Google glasses
- Student-feedback mechanisms
 - Binary choice, slider, dial, etc.
- Teacher in-class feedback mechanism
 - Alarm, notification, screen change
- After-class data visualization for feedback
 - Frequency graph, “Current Status” graph, etc.

TEACHER - DURING LECTURE - SCREEN

☐ Students currently online

05:13 until the end of lecture

Threshold 97%

Teaching [lecture Topic]

4:11 pm

(Nice Color)

Teaching [Topic]

end lecture

☒ Students currently online

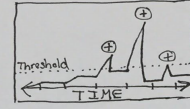
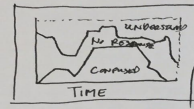
READ THE ROOM

Threshold 92%

Threshold Exceeded!

☐ % of students are confused.

TEACHER - POST LECTURE - DASHBOARD



- 1) 4:03 - 14 students ④
- 2) 4:25 - 18 students ④
- 3) 4:40 - 10 students ④

1	2	3	4	5
---	---	---	---	---

TIME: 9:03

Students: 14

Notes:

9:47

15 students

Notes:

STUDENT - IN CLASS - CLICKER

Phone / iPod

panic!

UNDERSTAND

Don't Understand

UNDERSTAND

Don't Understand

UNDERSTAND

Don't Understand

UNDERSTAND

Don't Understand

UNDERSTAND!

YES!

SORT OF

NO!

Have in...

Understand

Don't Understand

Have in...

Understand

Don't Understand

Class: Example

Understand

Don't Understand

Class: Example

Understand

Don't Understand

YES!

SORT OF

NO!

Apple Watch:

Understand

Don't Understand

Understand

Don't Understand

Understand

Don't Understand

Student

"I Really Understand"

Submit

"I Really Don't Understand"

Teacher

Threshold Exceeded

15 students

Don't Understand

4 - 1 student

3 - 2 students

2 - 4 students

1 - 8 students

Read the Room

Teacher

1	2	3	4			
---	---	---	---	--	--	--

TIME: 9:03 AM

15 Students Don't Understand

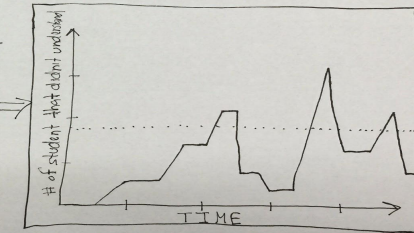
4 - 1 student

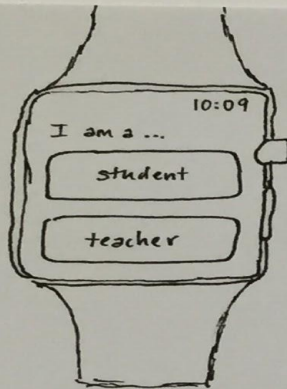
3 - 2 students

2 - 4 students

1 - 8 students

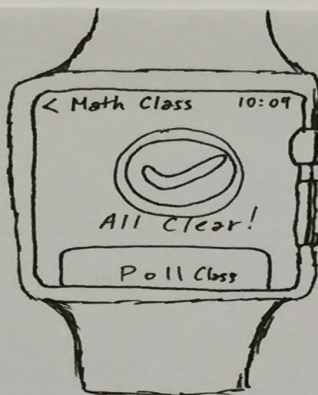
Notes:





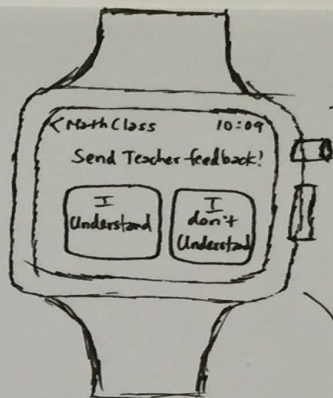
Welcome Screen

First entry into app asks the user to indicate whether user is a student or a teacher.



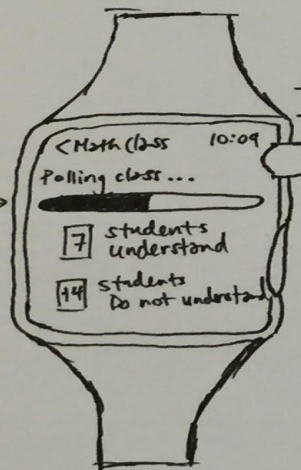
Teacher Screen

When the threshold is not exceeded, the teacher's interface is green and at peace. They have the option to poll.



Student Screen

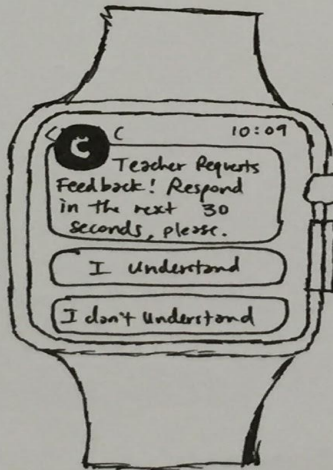
This screen uses force touch so the students can push a button harder to indicate that they REALLY don't understand or understand.



Teacher Poll View

Live updates on teacher's end as students respond to the notification from the teacher.

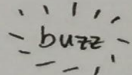
Progress bar fills as students respond.



Student Screen Notification

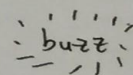
Teacher asks for feedback directly.

"Poll Class"



Teacher Warning/Notification

explains how many students are at which level of confusion.



Interface Choice and Brief Justification

We decided iPads/iPhones because:

- Although Apple Watch was convenient for student input and teacher notifications, it's constrained by low adoption.
- More importantly, most other interfaces were cumbersome on such a small screen, especially after-lecture review
- iPads and iPhones were the opposite: all interfaces were intuitive and convenient, and adoption is high

Interface Choice and Brief Justification Continued...

We decided on binary input because:

- It's less disruptive (brief glance at phone)
- Easier for teacher to interpret than “continuous” input

Overview of Talk

1. Brainstorming and picking between possible devices and UIs
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4. User experimentation and feedback

Task 1: Student Gives Feedback

THE FIRST TIME THAT A STUDENT OPENS THE APP They are prompted as to whether they are a Student or A Teacher

ARE You A...

STUDENT

TEACHER

"STUDENT"

Default screen after the student has entered the app at least ones. They can either enter an existing class or add a new class

MY CLASSES (+)

NOT ENROLLED IN ANY CLASSES

ENROLL IN CLASS (+)

Each Class has essentially the same screen, but different Subject Title

MATH

I UNDERSTAND

I DON'T UNDERSTAND

Students can enter either "I Understand" or "I don't Understand" to give feedback to teacher Anonymously. If enough students don't understand, the Teacher will be prompted that many students are confused.

Note: I don't Understand is larger because we want to encourage students to use it, as that's part of the core functionality/tasks.

To add a new class, students put in a code provided to the class by the teacher.

ENTER CLASS CODE (+)

YOUR TEACHER WILL PROVIDE YOU WITH YOUR CLASS CODE

Explains what a "class code" is, if it wasn't already clear

Task 2: Teacher "Reads the Room"

THE FIRST TIME THAT A Teacher OPENS THE APP they are prompted as to whether they are a Student or A Teacher

Default screen after the teacher has entered the app at least once. They can either enter an existing class or add a new class

Class home screen allows Teacher to Review Lectures or Start new Class Session

The "poll class" button allows teachers to notify their students to give feedback

ARE You A...

STUDENT

TEACHER

ENTER Your .EDU EMAIL ADDRESS

AFTER THEIR FIRST LOGIN, TEACHER WILL START HERE

My CLASSES (+)

You have not created any CLASSES

Create CLASS (+)

Math 1

Past lecture Data

lec1 - addition

lec2 - ...

Start Class Session

MATH 1

Long Division 1

Acc CLEAR

Passively Receive Students' VOTES

15 STUDENTS CAN

Poll CLASS

DISMISS

Poll CLASS

Default screen while teaching. Tells teacher the class is going well

GREEN BACKGROUND

THRESHOLD EXCEEDED (CLOSED)

RED BACKGROUND

7 Students Understand

2 students Don't Understand

live data presented to teacher as students respond. Bar at the top indicates how much of class has responded. Arrow at bottom is to move on to normal screen.

ENTER THE CLASS NAME

* OF ENROLLED STUDENTS

HERE IS YOUR CLASS CODE:

1234 567

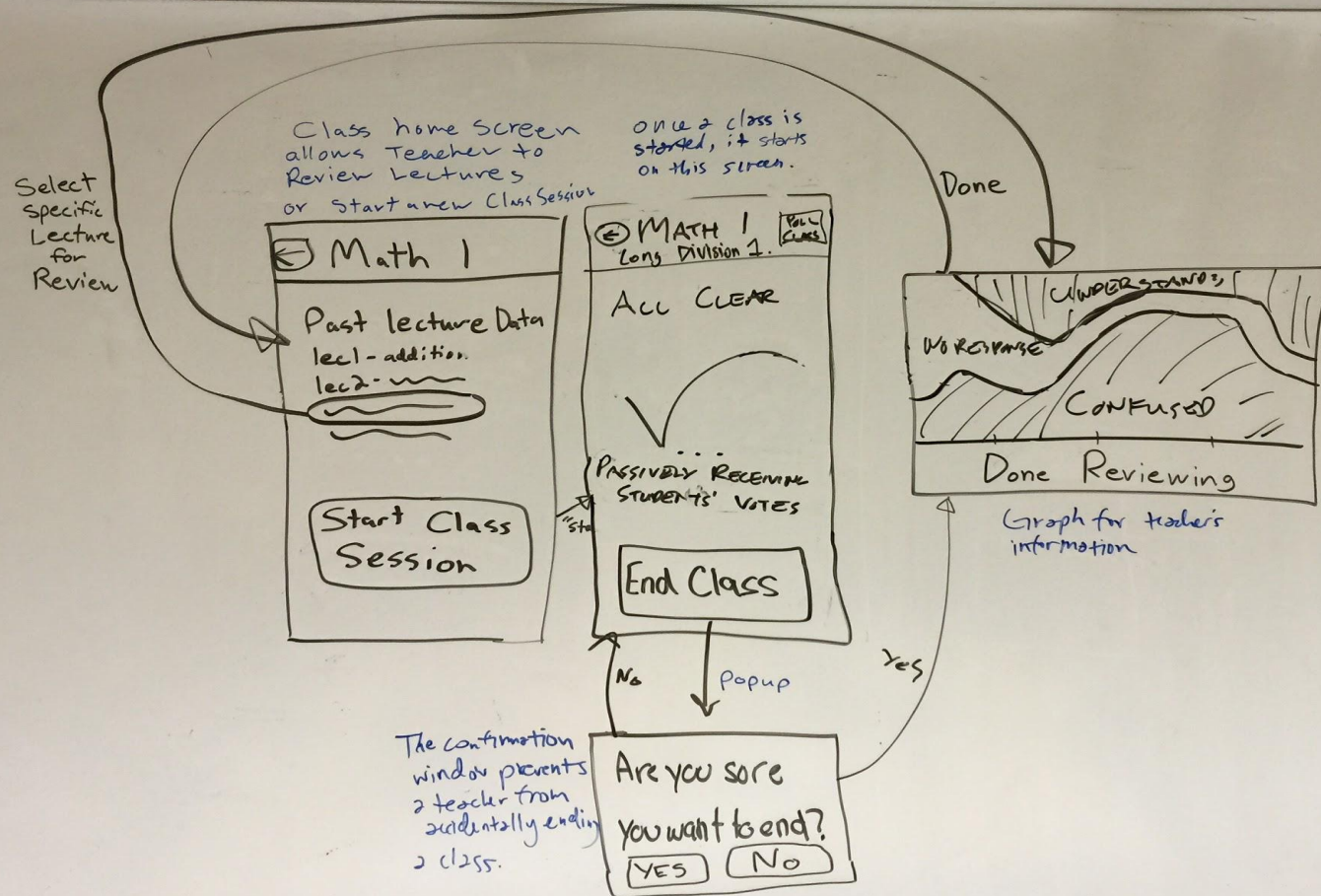
If enough students are confirmed, screen changes to indicate that the teacher should change something

TEACHER MUST VERIFY THAT THEY HAVE A .EDU EMAIL ADDRESS

INPUT CLASS NAME SO THAT TEACHER CAN DIFFERENTIATE THEIR CLASSES

INPUT # STUDENTS FOR PERSONALIZATION

Task 3: Teacher Reviews Lecture



Overview of Talk

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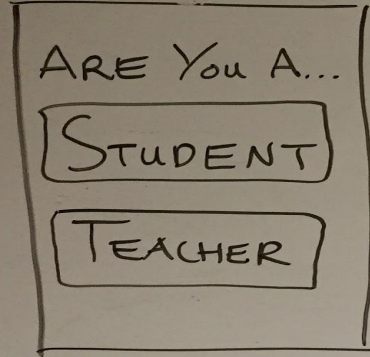
Prototype Decisions

- Used the Style and Technique recommended by Landay: Pen and Paper for Low-Fi Prototype
 - Also allowed trying on-site updates of prototype
- Significant use of pop-ups (also in flow) because:
 - Simple way to transmit small bits of information
 - Avoids user losing track of place in app

Flow & Low-Fi Animation

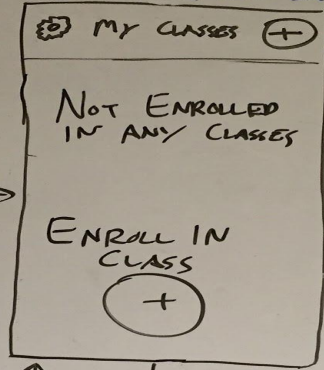
Task 1: Student Gives Feedback

THE FIRST TIME THAT A STUDENT OPENS THE APP THEY are prompted as to whether they are a Student or A Teacher

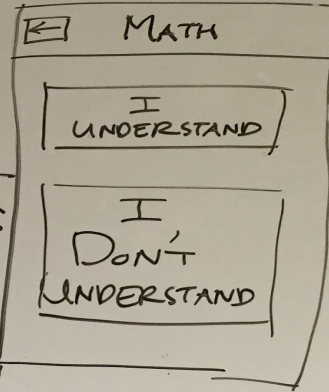


"STUDENT"

Default screen after the student has entered the app at least ones. They can either enter an existing class or add a new class



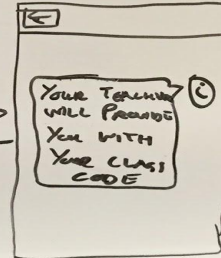
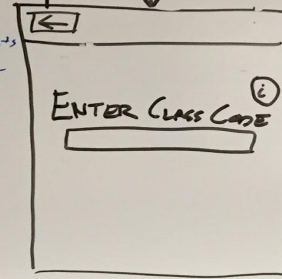
Each Class has essentially the same screen, but different Subject Title



Students can enter either "I Understand" or "I don't Understand" to give feedback to teacher Anonymously. If enough students don't understand, the Teacher will be prompted that many students are confused.

Note: I don't Understand is larger because we want to encourage students to use it, as that's part of the core functionality / tasks.

To add a new class, students put in a code provided to the class by the teacher.



Explains what a "class code" is, if it wasn't already clear

Welcome To clicked !

I am a ...

Student

Teacher

Welcome To clicked !

I am a ...

Student

Teacher

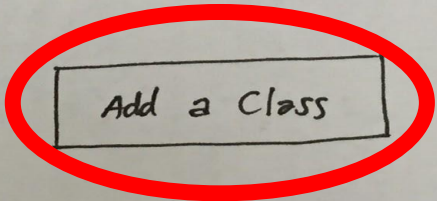
My Classes

- NO CLASSES -

Add a Class

My Classes

- NO CLASSES -



Add a Class

Your Teacher will give you
a 5-digit code to
join the class.

continue

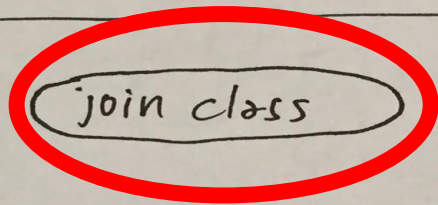
Your Teacher will give you
a 5-digit code to
join the class.

continue

Enter Your Class Code :

join class

Enter Your Class Code :




Enter Your Class Code :

join class

Q W E R T Y U I O P

A S D F G H J K L

Z X C V B N M 

1 2 3

space

return

Enter Your Class Code :

join class

Q

W

E

R

T

Y

U

I

O

P

A

S

D

F

G

H

J

K

L

Z

X

C

V

B

N

M

⌫

123

space

return

Enter Your Class Code :

3M2XZ

Are you sure you want
to join "Math: Pre-Calculus" ?

Yes, join class

No, enter code again

Enter Your Class Code :

3M2XZ

Are you sure you want
to join "Math: Pre-Calculus" ?

Yes, join class

No, enter code again



Math: Pre-Calculus

I

Understand

I

Don't

Understand



Math: Pre-Calculus

I
Understand

I
Don't
Understand



Math: Pre-Calculus

Your response has been recorded. Hitting the same button will not relay any additional information for **3** minutes.

okay



Math: Pre-Calculus

Your response has been
recorded. Hitting the same
button will not relay any
additional information for **3** minutes.

okay



Math: Pre-Calculus

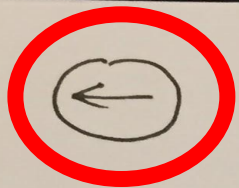
I

Understand

I

Don't

Understand



Math: Pre-Calculus

I
Understand

I
Don't
Understand

My Classes

English : British Literature

Add a Class

Task 2: Teacher "Reads the Room"

THE FIRST TIME THAT A Teacher OPENS THE APP they are prompted as to whether they are a Student or A Teacher

ARE You A...

STUDENT

TEACHER

ENTER Your .EDU EMAIL ADDRESS

INPUT CLASS NAME SO THAT TEACHER CAN DIFFERENTIATE THEIR CLASSES

INPUT # STUDENTS FOR PERSONAL

Default screen after the teacher has entered the app at least once. They can either enter an existing class or add a new class

My CLASSES (+)

You have not created any CLASSES

Create CLASS (+)

ENTER THE CLASS NAME

OF ENROLLED STUDENTS

Class home screen allows Teacher to Review Lectures or Start new Class Session

Math 1

Past lecture Data

lec1 - addition

lec2 - ...

Start Class Session

The "poll class" button allows teachers to notify their students to give feedback

MATH 1

Long Division 1

Acc CLEAR

Passively Receive Students' VOTES

"Dismiss"

15 STUDENTS CANVASE

Poll CLASS

DISMISS

If enough students are confirmed, screen changes to indicate that the teacher should change something

Default screen while teaching. Tells teacher the class is going well

GREEN BACKGROUND

THRESHOLD EXCEEDED

TRIGGERED

RED BACKGROUND

7 Students Understand

2 students Don't Understand

live data presented to teacher as students respond. Bar at the top indicates how much of class has responded. Arrow at bottom is to move on to normal screen.

Welcome To clicked !

I am a ...

Student

Teacher

Welcome To clicked !

I am a ...

Student

Teacher

Welcome To clicked !

Please Confirm that you're a Teacher :

Yes, I'm a teacher

Go Back

Welcome To clicked !

Please Confirm that you're a Teacher :

Yes, I'm a teacher

Go Back

Teacher Dashboard

- NO CLASSES -

Create Class

Teacher Dashboard

- NO CLASSES -

Create Class

Create a Class

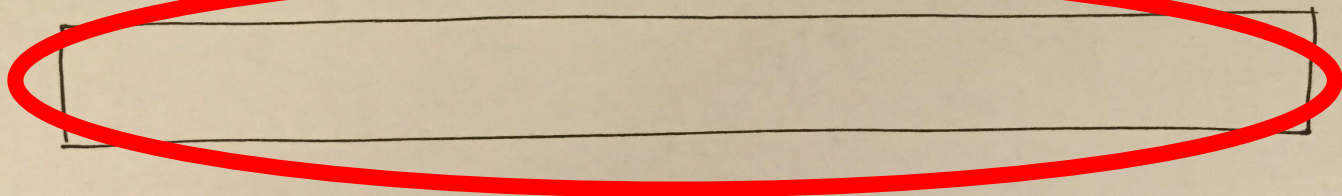
Enter Class Name:

submit name

Cancel

Create a Class

Enter Class Name:

A hand-drawn rectangular box intended for text input. The box is empty and is highlighted with a thick red oval drawn around its perimeter.

submit name

Cancel

Create a Class

Enter Class Name:

English: British Literature

submit name

Cancel

1	2	3	4	5	6	7	8	9	0
-	/	:	;	()	\$	&	@	"
	.	,	?	!	'				⌫
ABC	space								

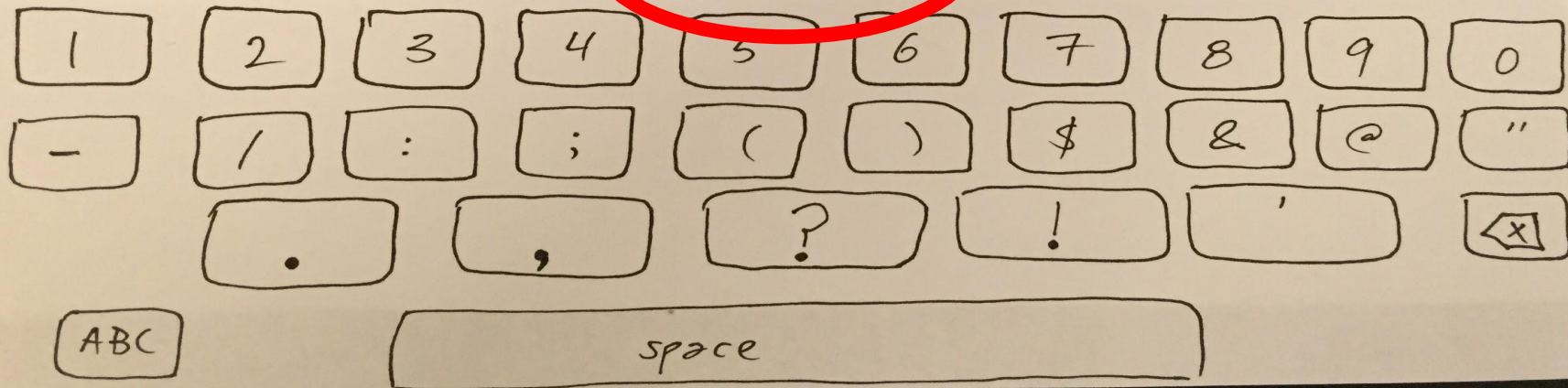
Create a Class

Enter Class Name:

[English : British Literature]

submit name

Cancel



Create a Class

Your class

English: British Literature

was successfully created!

Your class code is

76543

Continue

Create a Class

Your class

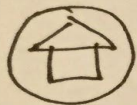
English: British Literature

was successfully created!

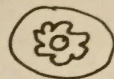
Your class code is

76543

Continue



English: British Literature
code: 76543



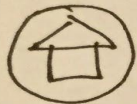
Past Lectures

"King Lear and Integrals"	10-15-15
"Shakespeare's Limits"	10-14-15
"Deriving English Words"	10-13-15
"My Fair Series"	10-12-15

students
enrolled:

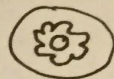
27

Start A Lecture



English: British Literature

code: 76543



Past Lectures

"King Lear and Integrals"	10-15-15
"Shakespeare's Limits"	10-14-15
"Deriving English Words"	10-13-15
"My Fair Series"	10-12-15

students
enrolled:

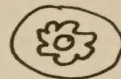
27

Start A Lecture



English: British Literature

code: 76543



students
enrolled:

27

Enter Lecture Name

Start Lecture

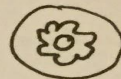
Cancel

Start A Lecture



English: British Literature

code: 76543



students
enrolled:

27

Enter Lecture Name

Start Lecture

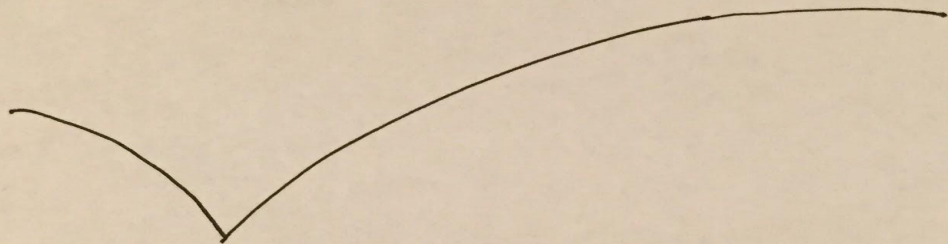
Cancel

Start A Lecture

Lecture Title

End
Lecture

ALL CLEAR



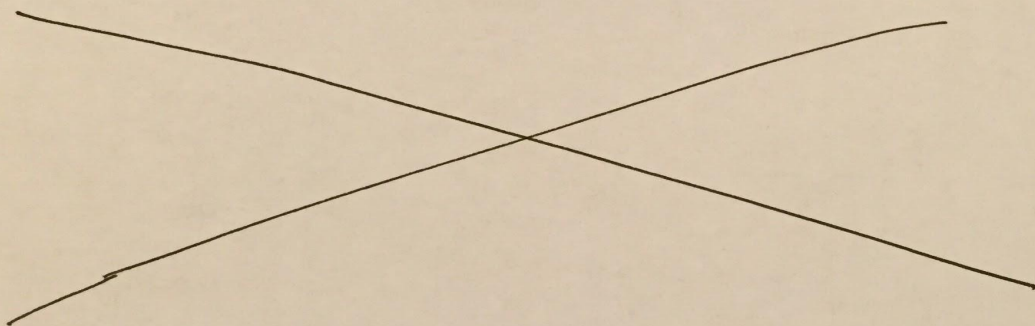
Passively polling students...

Poll Class

Lecture Title

15

Students Confused



Poll Class

Ignore

000 Wifi



2:50

Sunday, October 18



clicked 1m ago

Your Threshold has been exceeded!

15 students do not understand

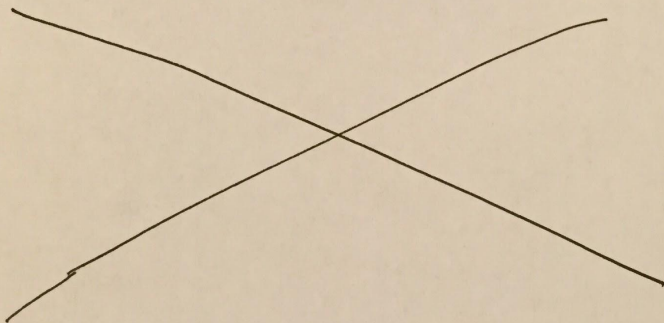
slide to open app



Lecture Title

15

Students Confused

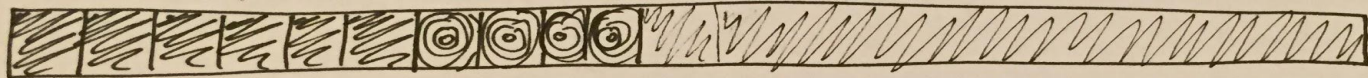


Poll Class

Ignore

Lecture Title

currently: under threshold



6

students understand

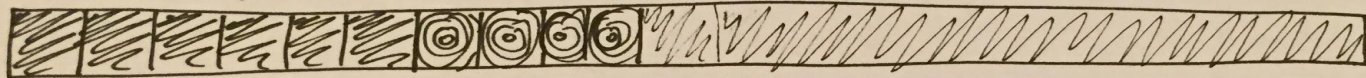
4

students don't understand

Done Polling

Lecture Title

currently: under threshold



6

students understand

4

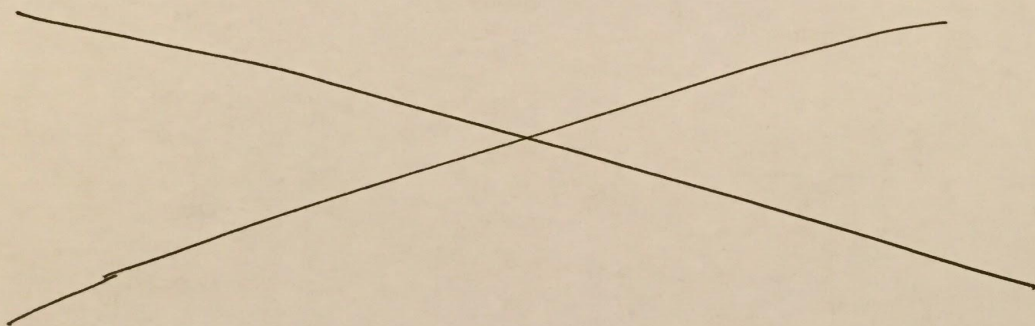
students don't understand

Done Polling

Lecture Title

15

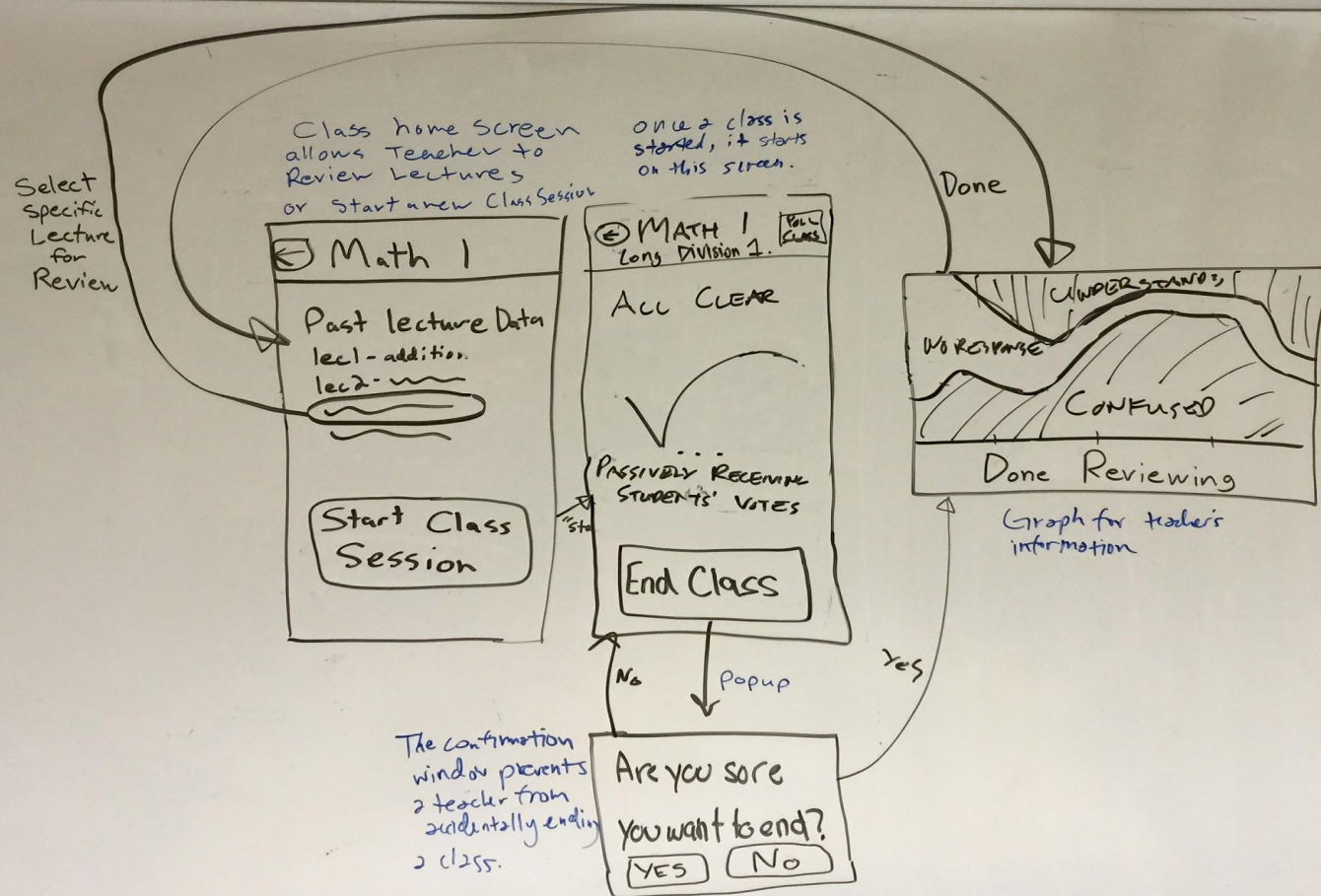
Students Confused



Poll Class

I ignore

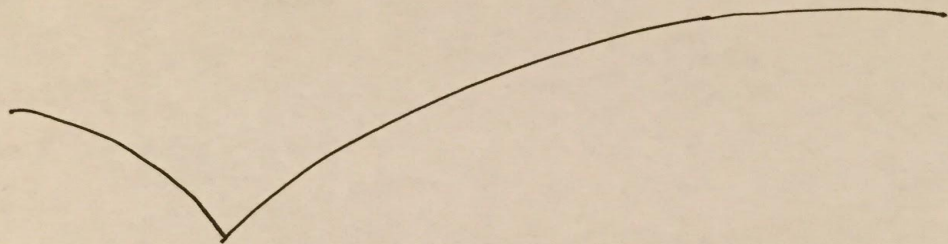
Task 3: Teacher Reviews Lecture



Lecture Title

End
Lecture

ALL CLEAR



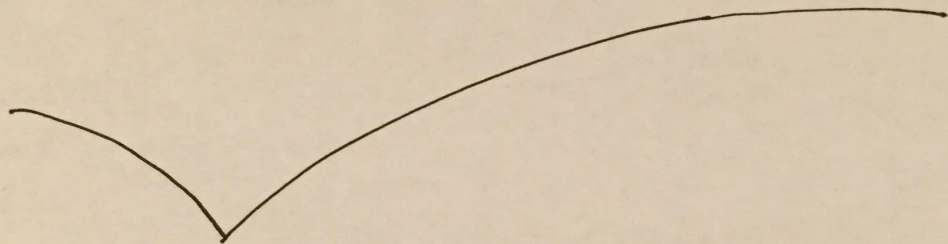
Passively polling students...

Poll Class

Lecture Title

End
Lecture

ALL CLEAR



Passively polling students...

Poll Class

Lecture Title

Date

No Response

Under Stand

Confused

Done Reviewing

0:00

10:00

40:00

Lecture Title

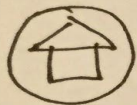
Date

No Response

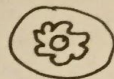
Under Stand

Confused

Done Reviewing



English: British Literature
code: 76543



Past Lectures

"King Lear and Integrals"	10-15-15
"Shakespeare's Limits"	10-14-15
"Deriving English Words"	10-13-15
"My Fair Series"	10-12-15

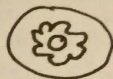
students
enrolled:

27

Start A Lecture



English: British Literature
code: 76543



students
enrolled:

27

Past Lectures

"King Lear and Integrals"	10-15-15
"Shakespeare's Limits"	10-14-15
"Deriving English Words"	10-13-15
"My Fair Series"	10-12-15

Start A Lecture

Lecture Title

Date

No Response

Under Stand

Confused

Done Reviewing

0:00

10:00

40:00

Lecture Title

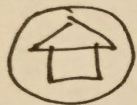
Date

No Response

Under Stand

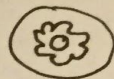
Confused

Done Reviewing



English: British Literature

code: 76543



Past Lectures

"King Lear and Integrals"	10-15-15
"Shakespeare's Limits"	10-14-15
"Deriving English Words"	10-13-15
"My Fair Series"	10-12-15

students
enrolled:

27

Start A Lecture

Overview of Talk

1. Brainstorming and picking between possible devices and UIs
2. Narrowing UI flow for each task
3. Constructing prototype for tasks and necessary functionality
4. User experimentation and feedback

Experimental Method

Participants:

- Teachers who used iPads Frequently
- Teachers who didn't
- Students who didn't mind speaking up in class
- Students who did

Environment: Teacher's Office, Teachers' Lounge, Library

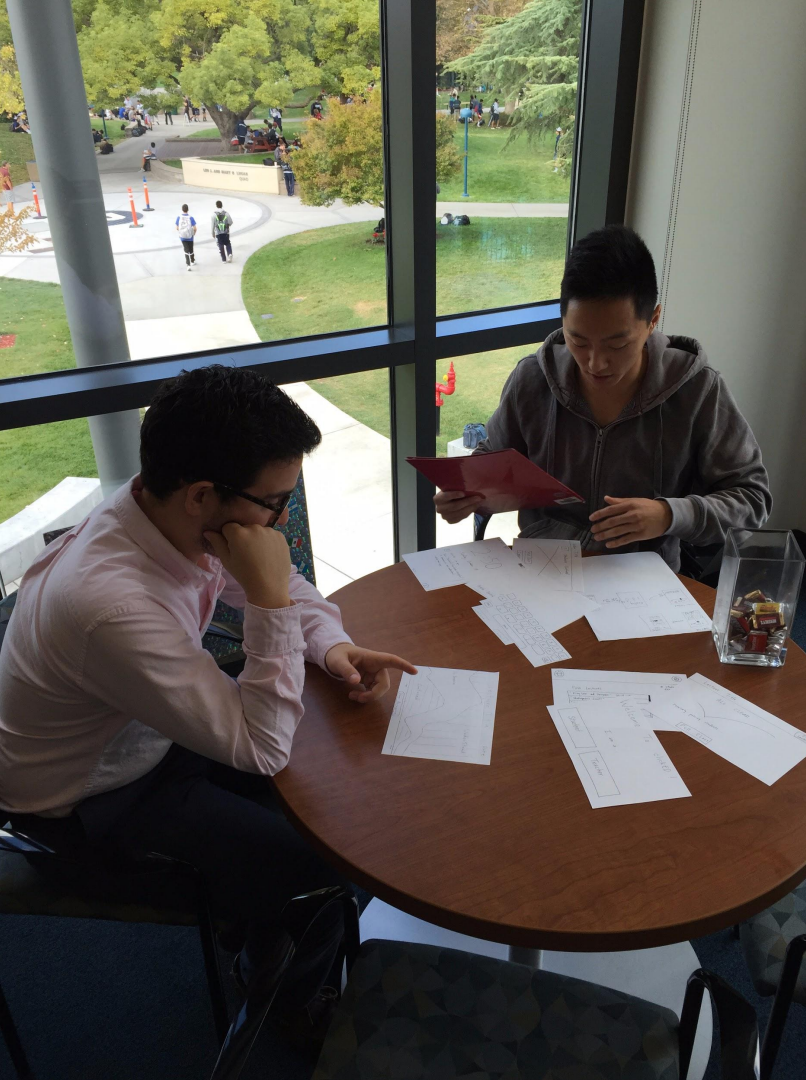
Experimental Method Continued...

Procedure:

- Gordon facilitated, but said little during tasks
- Michael acted as the computer
- Jake took notes

Test Measurements:

- Number and severity of errors
- Time to complete
- Demonstrated interest and usefulness [subjective]



Interview 1 - Teacher

Subject 3 - Spanish Teacher

- Slow with navigation
- Confused on lecture-running slide (“All Clear” slide)
- Couldn’t get much useful information out of graph

Suggested UI Changes

- “All Clear” Screen is confusing - Clarify purpose in app
 - e.g. give a tutorial with explanations
- “Don’t understand” button insufficient - specific feedback.
 - e.g. let students input what topic they are confused about
- Remove “Class Code” Screen - unnecessarily confuses teacher

Interview 2 and 3 - Teachers

Subject 1 - Religious Studies Teacher

- Navigated quickly with one error
- Got minor information from graph

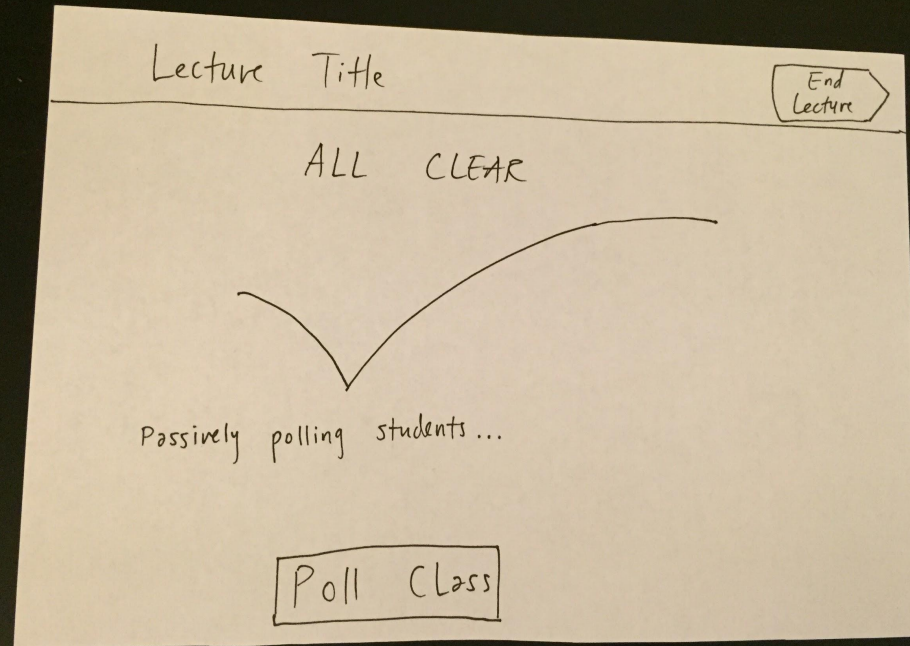
Subject 2 - History Teacher

- No errors, modest speed
- Wanted individual student info on the Graph

Suggested UI Changes

- De-anonymize students so can get more info in graph
- Don't call it "lecture"
- Allow flexible polling - e.g. allow teacher to create a "one question quiz"

Single largest cause of confusion:



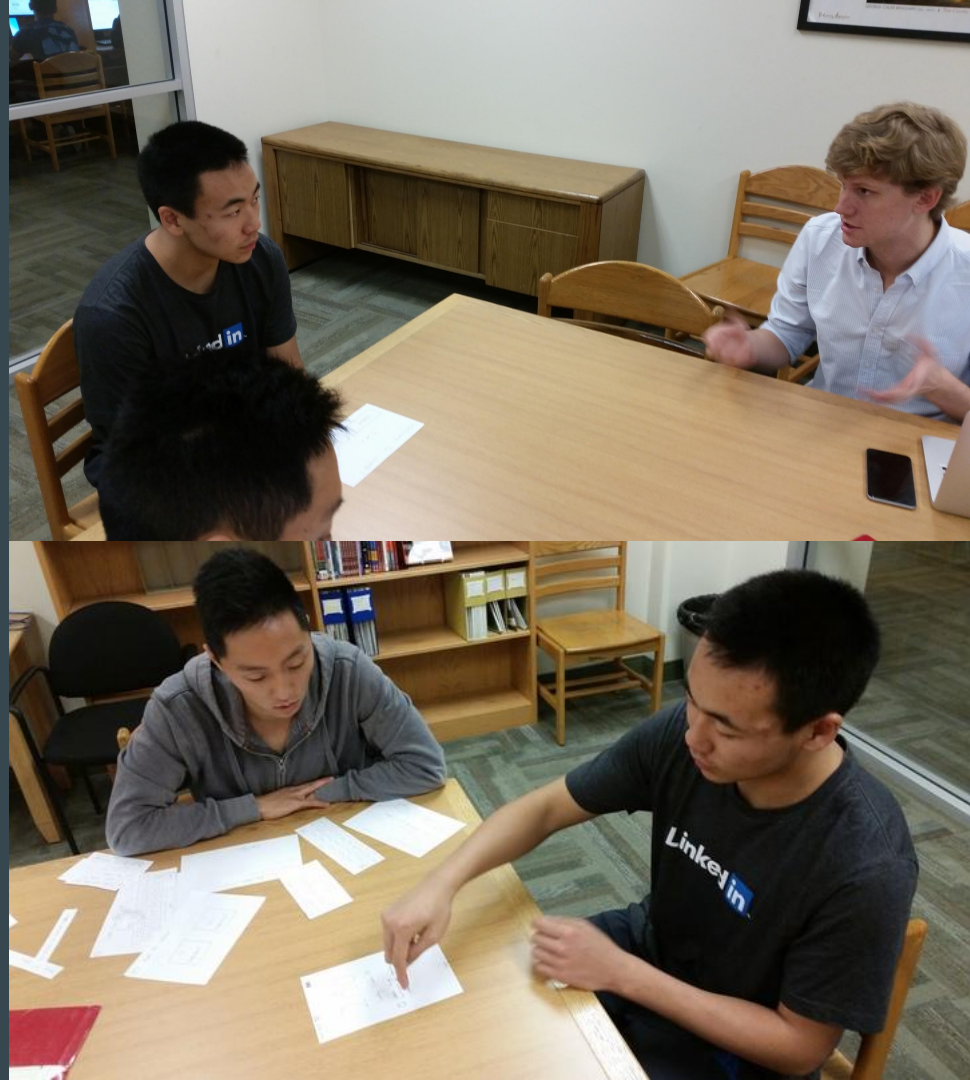
Interview 4 and 5 - Students

Subject 4 - active student

- Fast, no errors
- Said useful for others

Subject 5 - passive student

- Fast, no errors
- Hesitate to give feedback



Suggested UI Changes

- Anonymous during class - students didn't want to get "checked on" during class
- De-Anonymize after class - both students agreed this would be fine with students, and useful for teachers
- Let students be specific - let students say specifically where they got lost

Overview of Talk

1. Brainstorming and picking between possible devices and UIs
2. Narrowing UI flow for each task
3. Constructing prototype for tasks and necessary functionality
4. User experimentation and feedback

Overview of Talk - End

5. Feedback or Questions?