



formative

Assessment Made Easy

Matan Z, Lavanya J, Laila C
CS377E, Spring 2015
Stanford University

Talk Outline

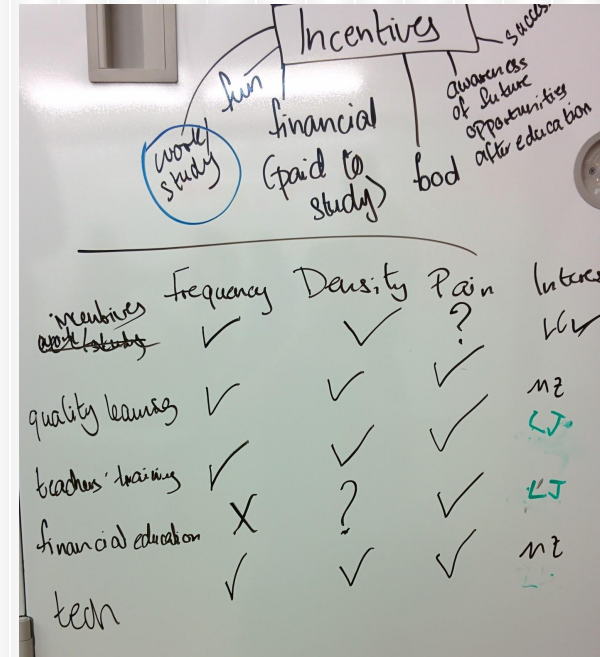
- Initial Scope
- Stages of Needfinding
- Our Solution & Evolution of Design

The Problem - Initial Scoping

Technology to improve Education.

Focus on quality of learning.

Lack of access to technology will be a problem?



Needfinding - Interviews

- Access to tech + Teacher training
- ~~Teacher~~ Internet = source of knowledge
- Teachers as learning coaches



Pratham

Every Child in School & Learning Well

Point of View - Evolution

We **met a high-school teacher** who teaches a class of students with mixed abilities, that **needs to pay attention to students who are behind**, without singling them out, **because** they have the skills; thus **further attention may help them catch up** and do well in class.

Needfinding - Task Analysis

- Assessment- formative, summative
- Lesson planning
- Helping students who are confused

Insight:

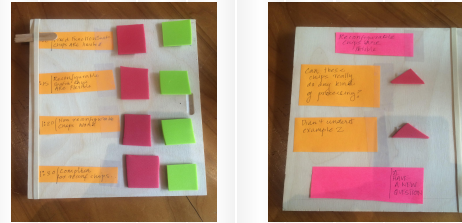
Assessment is hard.

- focus on many students at once
- students don't always speak up
- exams are stressful

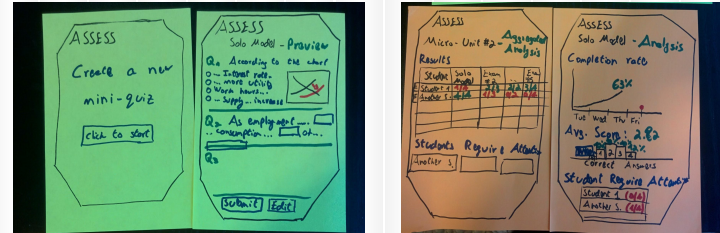


Needfinding-Parallel Prototypes

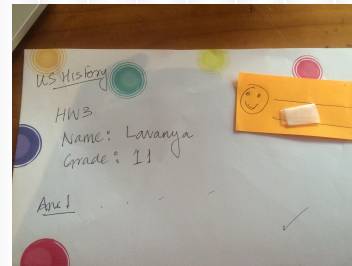
1. The lesson planner



2. Mini-challenges

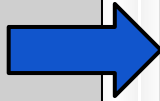


3. The positive feedback stamp



Point of View - Evolution

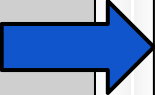
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We met **Debbie and Eric**, ECON teachers in Palo-Alto High School, who teach both AP and a regular class of mixed abilities. They need to provide special attention **and empower** students who are behind, **Because these students can do well given encouragement.**

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We met Debbie and Eric, who teach both AP and regular ECON high school classes of mixed abilities. They need to **provide students with easy ways to signal when they are confused**, **Because customizing the lesson periods** would make them much more effective.

Our Solution

Our Mission: Creating automated ways, both formal and informal, for students to signal teachers when they are confused.

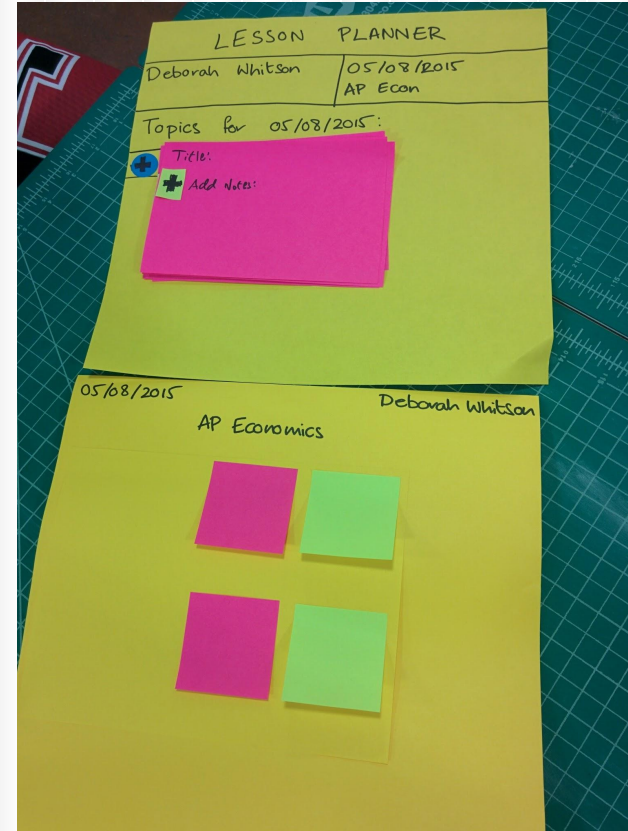
As a result, teachers could focus most of their time and attention on teaching, tailored for their students' needs.

Evolution of Solution Design



Low-Fi Prototype #1: Lesson Planner

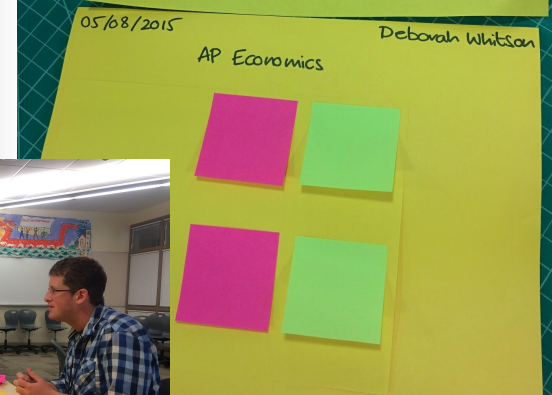
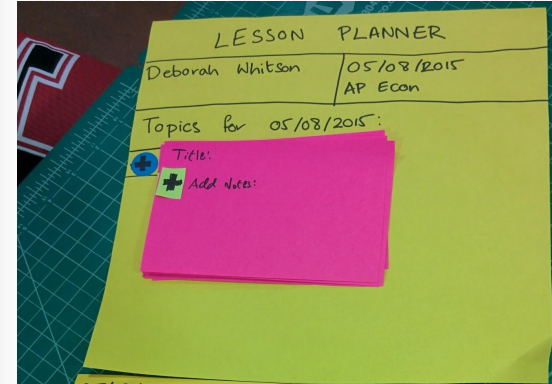
- **Feedback:**
Teachers said it would be **useful!**
- **However:**
 - Students might be confused about a specific term, not a whole topic.
 - Feels like teachers expect it to integrate with other existing tools.



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Teachers said it would be **useful!**
- **However:**
 - Students might be confused about a specific term, not a whole topic.
 - Feels like teachers expect it to integrate with other existing tools.

-> We couldn't clearly explain the added value over existing clickers.



Low-Fi Prototype #2: Quiz Studio

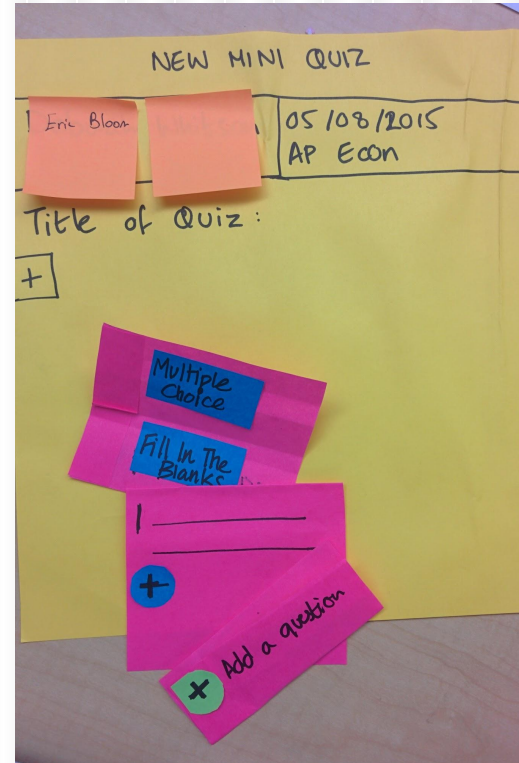
- **Feedback:**
formative assessment, good idea

- **However:**

Different teachers, different approaches:

- Paper quizzes, weekly basis.
- Hand out paper quizzes, work in groups.
- "Tech-savvy": **existing online quiz**

platforms...



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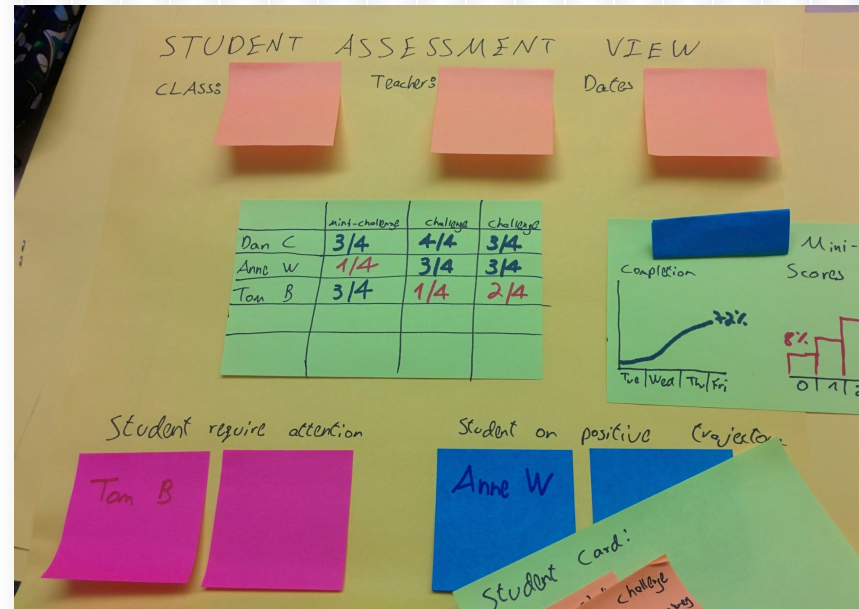
platforms...

-> Our product might be redundant.



Low-Fi Prototype #3: Assessment Center

- **Rationale:** visualize students and topics that require review, as assessed by the mini challenges
- **Feedback:**
 - “I really like that”
 - “Tracking over time is key”



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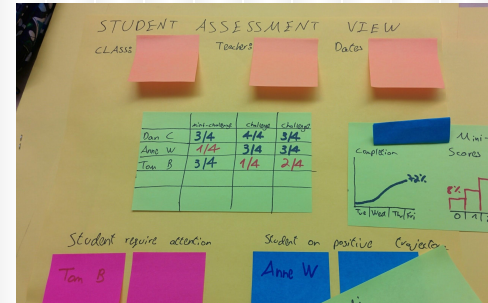
- **Feedback:**

"I really like that"

"Tracking over time is key"

- Existing online tools offer one-off quizzes; we couldn't find an analytics dashboard....

- **Potential value for teachers.**



Incorporating the feedback...

A Refinement to Our Solution

Revised Mission: Providing an analytics tool for teachers to gain insights regarding their students' understanding. Teachers keep their current methods for assessment.



Our Solution: Concept Video



Medium Fidelity Prototype

ASSESS



Economics - 11th Grade

Units Students Quizzes

Unit #5: Aggregate View

	Basics	Markets	Econ. Metrics	Demand Supply	Policy
Tom W	3/4	2/4	2/4	3/5	1/4
Linda J	1/4	2/4	4/4	4/5	3/4

...

NOTIFICATIONS

STUDENTS REQUIRING ATTENTION: Tom W last scores: 2/4, 2/4, 3/5, 1/4 (May 13)

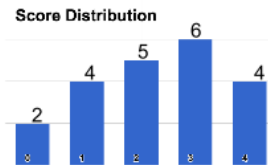
TOPIC TO REVIEW: ✖
Policy - average score: 1.45 (class average: 2.18) (May 2)

STUDENT SHOWING IMPROVEMENT: Linda J last scores: 2/4, 4/4, 4/5, 3/4 (May 8)

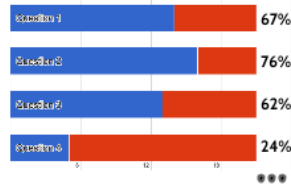
...

May 11: Formative Assessment

78%
Completion Rate
2.29/4
Average Score



Per Question Breakdown



...

Medium Fidelity Prototype

ASSESS [Refresh] [Settings] [Home] [Power]

Economics - 11th Grade [Dropdown] Units Students Quizzes

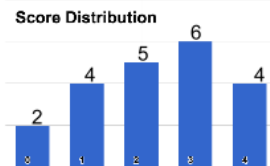
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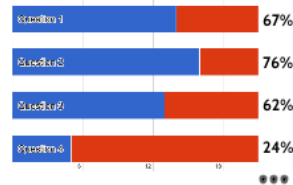
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...

Added: Notifications box

- Insights from the assessment center.
- Each notification links to the relevant report.

Medium Fidelity Prototype

ASSESS



Economics - 11th Grade

Units Students Quizzes

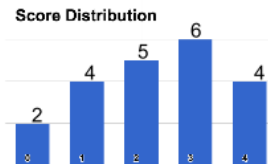
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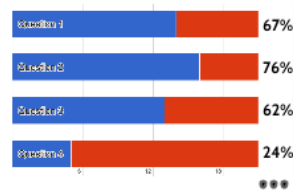
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...

Added:

Question Breakdown

- Following feedback from Mr. Gallagher

Medium Fidelity Prototype

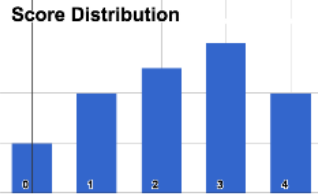
ASSESS

Economics - 11th Grade

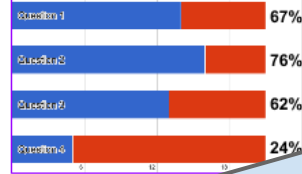
Units Students Quizzes

May 11: Formative Assessment (Policy)

78%
Completion Rate



Per Question Breakdown



2.29/4
Average Score



Students Questions: main topics



NOTIFICATIONS

STUDENTS REQUIRING ATTENTION: Tom W last scores: 2/4, 2/4, 3/5, 1/ (May 13)

TOPICS

STUDENTS SHOWING IMPROVEMENT: Linda J last scores: 2/4, 4/4, 4/5, 3/4 (May 8)



Added
Students Comments & Questions (free text)

- Can't infer everything from quiz scores
- Allowing the students to phrase confusing topics
- Surfacing an aggregated word-cloud

Our Solution: Final Design

formative Lavanya Jose

Economics - 11th grade

Chapter 5 - Aggregate View

Student	Basics	Markets	Econometrics	Demand	Policy
Laila Chima	2/4	2/4	3/4	3/4	4/4
Matan Zinger	3/4	2/4	1/4	2/4	1/4
Student 3	3/4	2/4	2/4	2/4	3/4
Student 4	4/4	3/4	3/4	4/4	2/4
Student 5	2/4	4/4	3/4	3/4	2/4
Student 6	3/4	2/4	2/4	2/4	4/4

formative Lavanya Jose

Economics - 11th grade

Chapter 5 - Aggregate View

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Student 4	4/4	3/4	3/4	4/4	2/4
Student 5	2/4	4/4	3/4	3/4	2/4
Student 6	3/4	2/4	2/4	2/4	4/4

Laila Chima has shown improvement!

Matan Zinger seems to be struggling on this topic.

formative Lavanya Jose

Economics - 11th grade

Students - Laila Chima

Questions Laila struggled with:

- What is $\sin^2 + \cos^2$?
- Formula for the area of a triangle

Laila's average score: 3/4

Recent trend: Improvement!

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Economics - 11th grade

Topic View: Policy

Students answering accurately:

Question 1	100%	78%
Question 2	67%	67%
Question 3	72%	72%

Student average: 2.5/4

Implementation: Tools Used

- **Post-its, post-its, post-its**
- Google Slides and InVision: for Medium Fi v1
- Illustrator → JustInMind: for Final Design
- iMovie: Editing the concept video

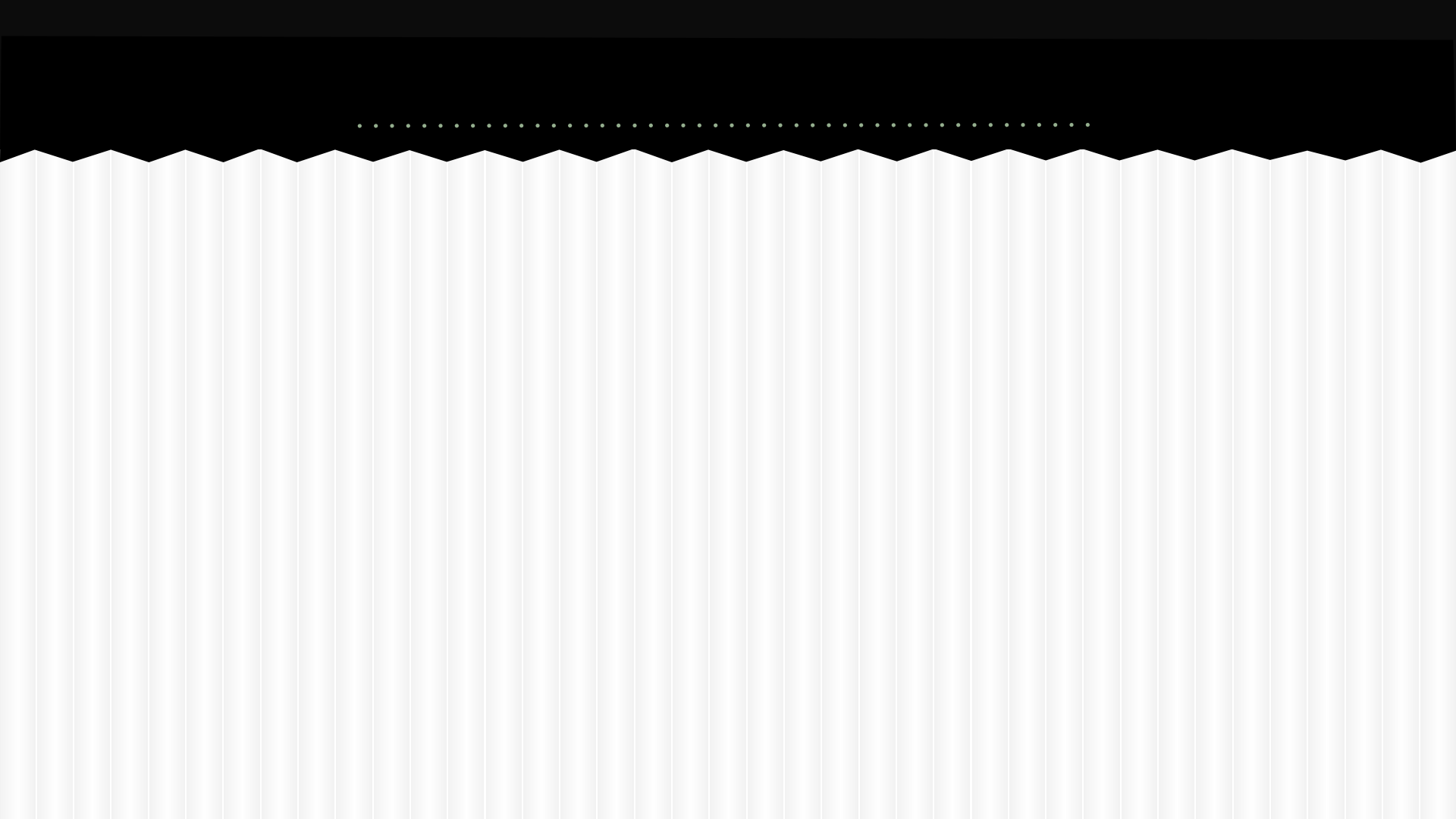
Conclusion

- Our scope has greatly changed since the first ideation session....
- We believe we found an underserved need.
- Also believe: key to success would be requiring next-to-zero effort from teachers, while providing useful insights.
- *“When will you build it? Our math teachers want it for the next school year” (Matan’s Mother...)*

Thank you!



Our thanks to Eric Bloom, Debbie Whitson, and teachers of Palo Alto High School, for their time and effort in providing us routine help, insights and feedback throughout this project.



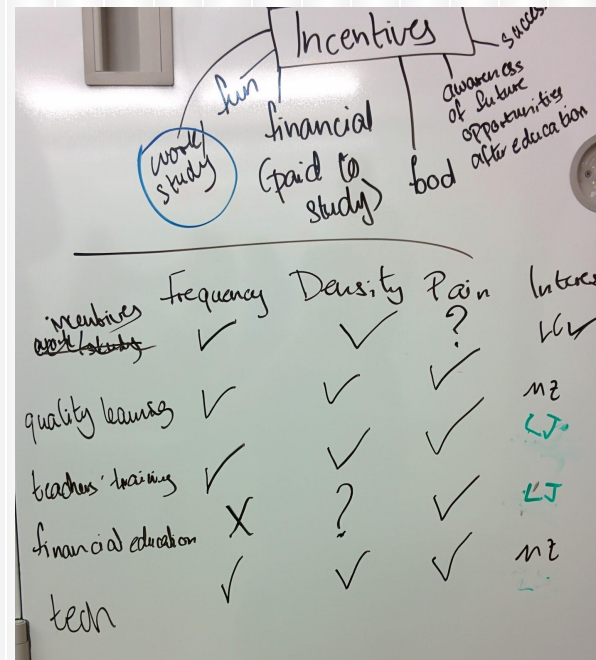
The Problem - Initial Scoping

Objective: Using Technology to Enhance Learning Quality

Focus: Making the most out of the time students spend in class

Assumption: The problem is lack of access to technology

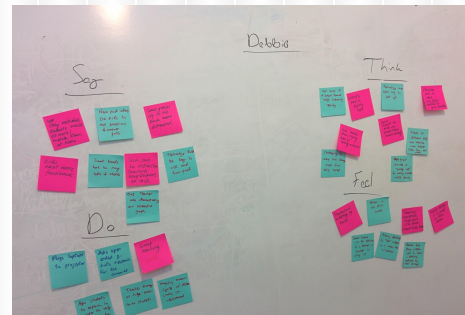
("low-band internationalized coursera?")



Needfinding - Interviews

Main Conclusions:

- Access to tech is not enough, methodology and training are required.
- Chalk-and-board teaching is outdated; teachers are no longer the gate for knowledge.
- With information available online, teachers become mentors for learning.



Needfinding - Task Analysis

Method: Observing classes, identifying tasks.

Follow-up interview: learning how to perform them ourselves.

Tasks Identified:

- Formative & Summative Assessment; Informal Assessment
- Executing the lesson plan, managing the class.
- Providing attention to students who 'struggle'.

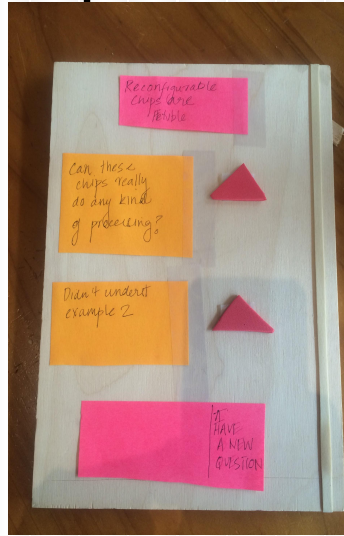
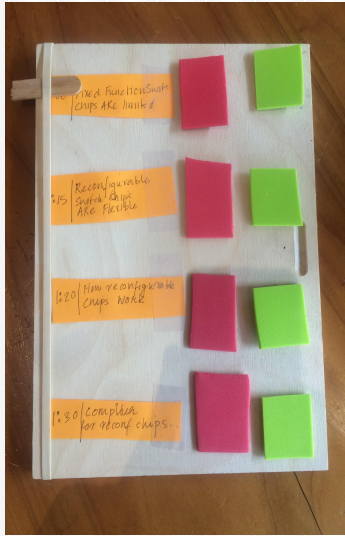
Insight:

Teachers spend a significant effort, in different ways, to gain information regarding students understanding.

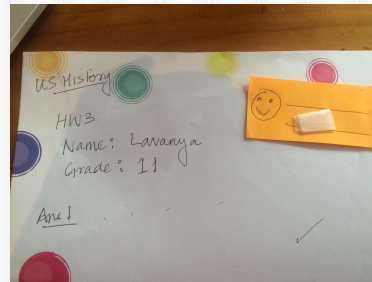
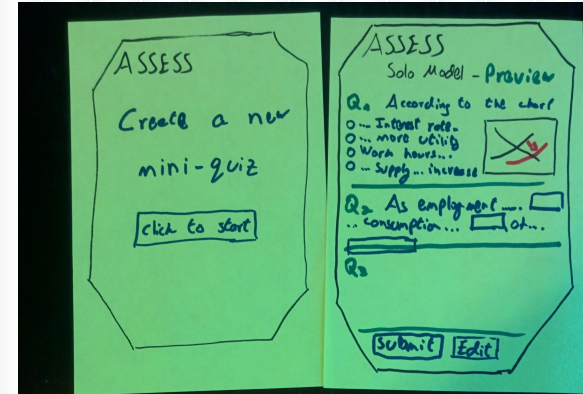


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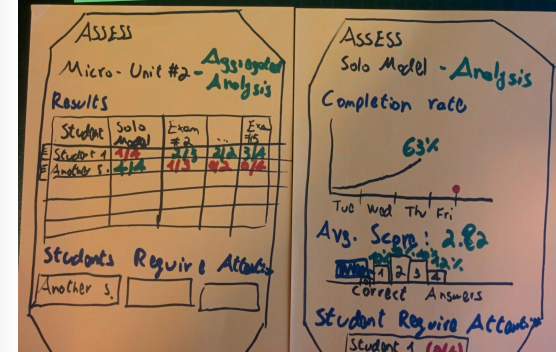
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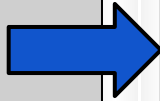


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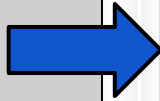
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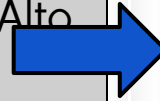
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