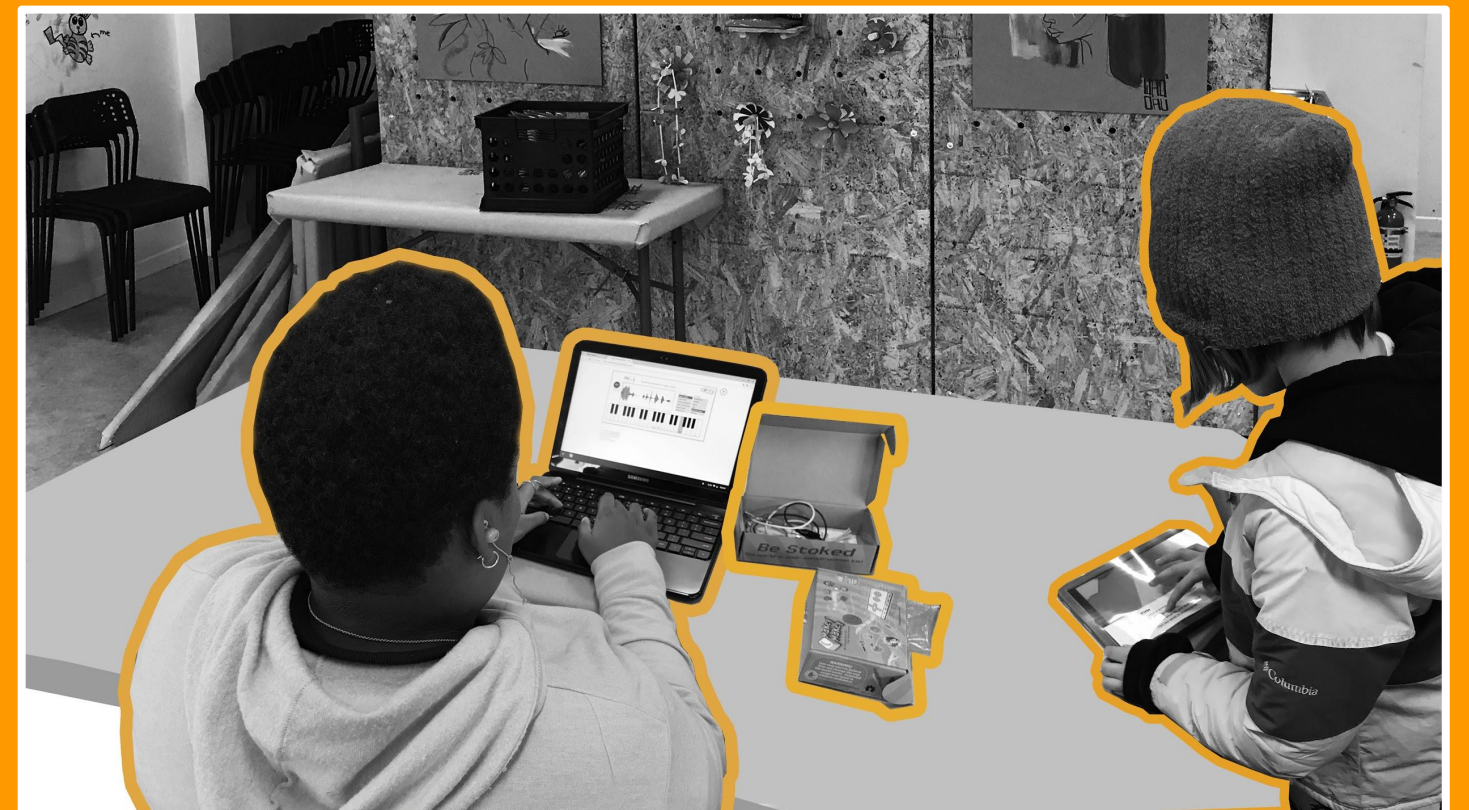


# Quaker Valley Insights Retrospective

2018

# About the Project

The way that students learn, use, and create technology has evolved dramatically in the past 10 years. Yet, the educational spaces we provide in libraries, schools, colleges, and universities for creative, project based learning have seen little to no innovation in decades. The introduction of **Maker technologies** like Arduinos, 3d printers, and laser cutters, enable students to create sophisticated looking artifacts, but they are often disconnected from deeper learning processes. The spaces and platforms need to evolve in ways that better support the children's creative inquiry and constructive learning. Drawing on arts-based practices of documentation and critique, this work will pioneer an integration of technology, space, and education to better connect students with their creative processes to strengthen and deepen learning. Ultimately, this exploratory project will not only develop an integrated set of situated documentation tools, but also will help us develop hypotheses for how documentation as a mediating process productively supports learning.



# Our approach

## Conjectures

### I. In the Moment

If documentation has a low threshold for enactment, then learners would document more.

### II. Retrospective

If there was a low threshold for reflecting upon documentation, then learners would reflect more.

### III. In the Community

If the community had access to documentation and reflection, then there would be more productive sharing and facilitation.

## Design Embodiment

### Space

Intelligent systems record traces of use and activation of space and tools by learners (time at tables, checkins, etc.)

### Process

Overhead cameras capture time-lapse and ready-at-hand tangible buttons enable in-the-moment annotation.

### Reflection

Video booth preserves a first-person reflective account of project work and progress towards outcomes.

### Network

Process Artifacts gathered, coordinated and reintroduced on networked displays for in-situ review and distributed critique.

## Mediated Learning Processes

### Noticing

Learning to attend to salient moments in performance, process, and progress.

### Articulating

Learning to use language and expression of performance, process, and progress .

### Reflecting

Learning to review, assess and use salient moments to advance performance, process, and progress .

### Critiquing

Learning to enact shared language to evaluate performance, process, and progress within the community .

## Learning Outcomes

### Fluency with Tools and Materials

Assessed by measuring ability to produce an outcome; accreditation by an expert; and indicators of craftsmanship.

### Presentation Skills

Assessed through presentations of work focusing on selection of appropriate examples, organization, clarity, conciseness, and completeness.

### Motivation and Affect

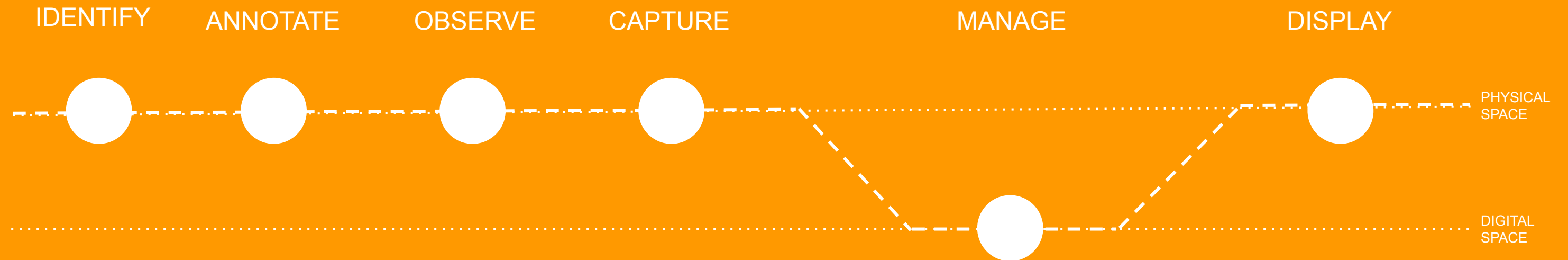
Assessed by measuring identity, interest, self-efficacy, and persistence.

### Practices Valued by the Learning Community

Assessed by observable evidence of self-directed inquiry, problem-solving and community engagement.

increased load for user enactment;  
increased distance from production;  
increased value of process data;

# Technologies of Interest



As part of this work, we're interested in developing new **tangible tools** or tools that have both a physical and a digital component that can help support maker and studio-based learning through documentation. We want to explore technologies that are:

1. Situated around learning,
2. At home in a makerspace; and
3. Make documentation better

With this in mind, our goal is to create tools that help to **trace processes through in-situ documentation activities**.

We see five key documentation activities that can be better supported with new digital tools:

- **Identify:** Tracing activity, resources, and people
- **Annotate:** Marking moments in learning
- **Observe:** Recording activities as they unfold
- **Capture:** Recording made artefacts
- **Display:** Presenting learning processes in-situ

While **management** is an essential component of good documentation practice, this often occurs in digital environments. We plan to embed it in our solutions but our focus is on making documentation activities *tangible* and *ready-at-hand* in learning spaces.

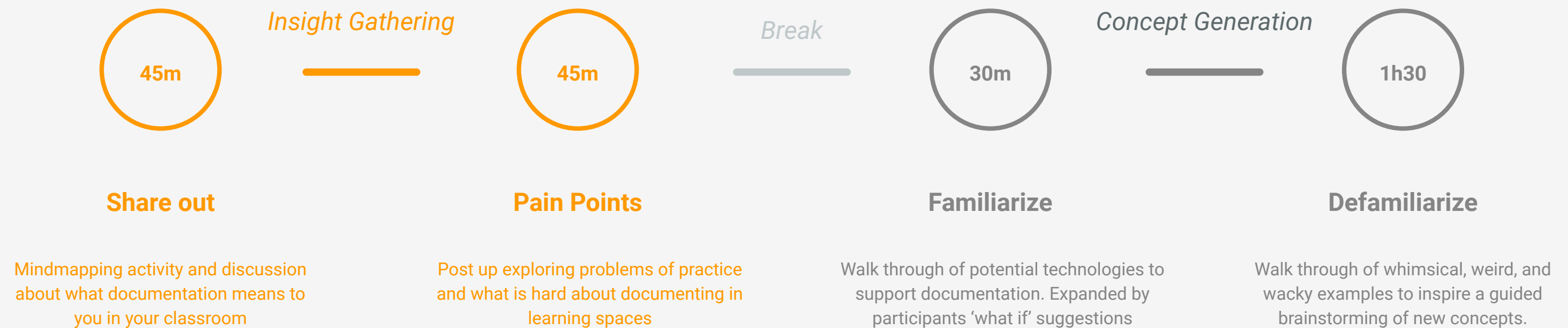
# About the Workshop

On Thursday, May 3rd, 2018, we conducted a small workshop with Quaker Valley educators and administrators: 3 administrators and 6 educators. As part of this workshop, we asked participants to take part in a series of generative co-design activities to envision how documentation could support students' personal growth and professional development through academic activities.

Participants mapped and discussed their perspective on what good documentation means to them as well as shared the challenges they faced in building a culture in their classroom that valued documentation. After reviewing a set of exemplar documentation tools, the group then brainstormed a series of potential technology-enhanced concepts to support documentation for Quaker Valley High School.



# Workshop 1 Process and Goals



## Purpose

- Engage real world users in co-design activities in order to uncover new ideas, priorities, and possibilities for enabling meaningful documentation in learning environments.
- Identify opportunities for prototypical or probative technologies that can be deployed quickly to learning spaces to support documentation practices.
- Build buy-in with key stakeholders at test-sites and develop a shared terminology and set of project objectives early in the design process.

## Intended Outcomes

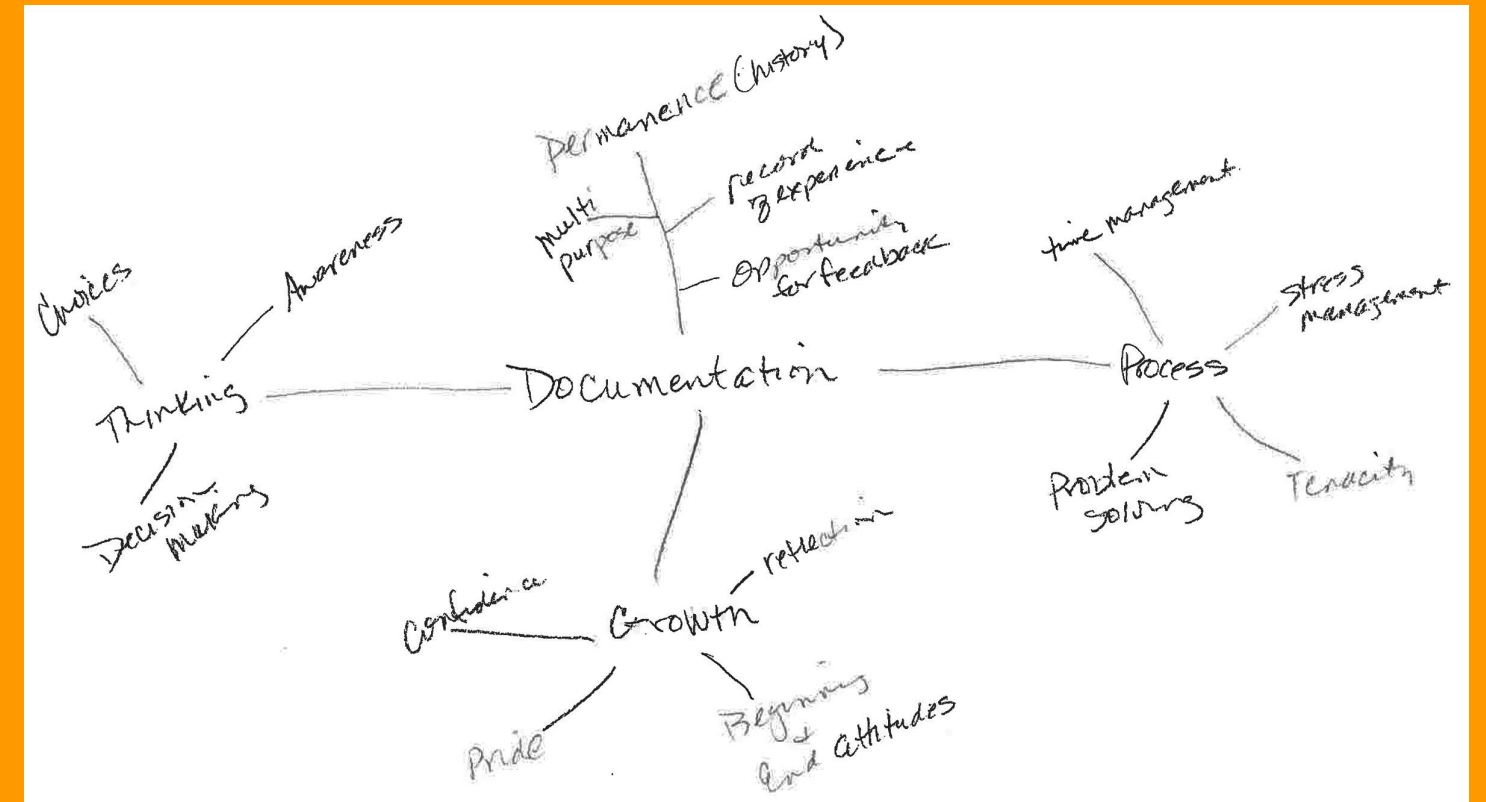
- Positively engage relevant educators at collaborating sites to participate in the design and study of smart documentation technologies.
- Establish more clarity about strategies that address the needs and concerns of key stakeholders.
- Generate new ideas for documentation technologies based on direct input from relevant stakeholders

# How Do You Define Documentation?

To start the workshop, participants were asked to think about documentation as a concept and a practice, and then asked to develop a mind map outlining their ideas. This activity aimed at helping the group develop a shared understanding of each person's views on documentation and the role each sees it playing in teaching and learning.

Some thematic areas that emerged include:

- Documentation occurs throughout a process: Participants often noted how multiple parts of a process will need to be documented because documentation actions (looking closely, sharing, etc.) happen at every stage.
- Documentation displays and supports student growth: Documentation was considered a way to assess student growth through the creation of “evidence” that can be displayed for them or teachers, parents, administrators, and peers to see.
- Documentation has purpose: Participants also often referred to the purpose or value of documentation, describing it as purposeful and used for some end goal, rather than documenting media for the sake of gathering pictures, video, etc.
- Documentation is social and collaborative in nature: Many participants acknowledged that students are part of a “community of learners”, learning from each other, receiving or providing feedback, and achieving goals together.



# Concept Map Synthesis

Each concept map tackled different aspects of documentation. Based on the types of concepts written in the map, the maps were categorized into Values, Process, and Outcome, and Tools & Evidence. Many of the maps included concepts from each of these categories, but most of them focused on one category more than another - often reflecting how that educator envisions documentation and what they feel is important.

## Values

These are important values that can be found as part of Quaker Valley's pedagogy, teacher practices, student assessment, etc.

## Mediated Process

These are physical activities that teachers or students complete that are part of a documentation process, such as reflect, share, etc.

## Learning Outcome

These are learning outcomes that Quaker Valley educators hope to see as a result of their teaching and documentation practices.

## Tools & Evidence

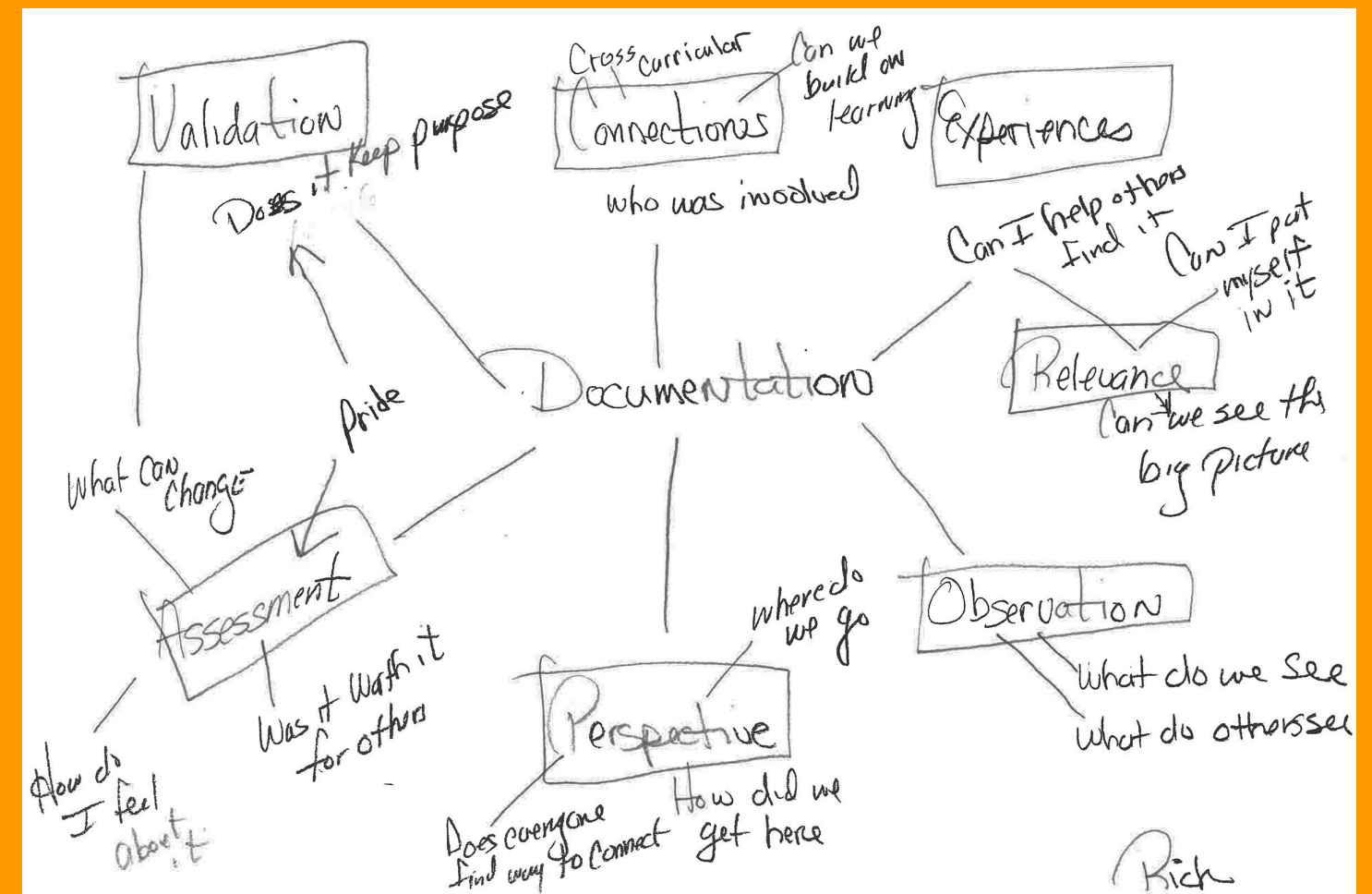
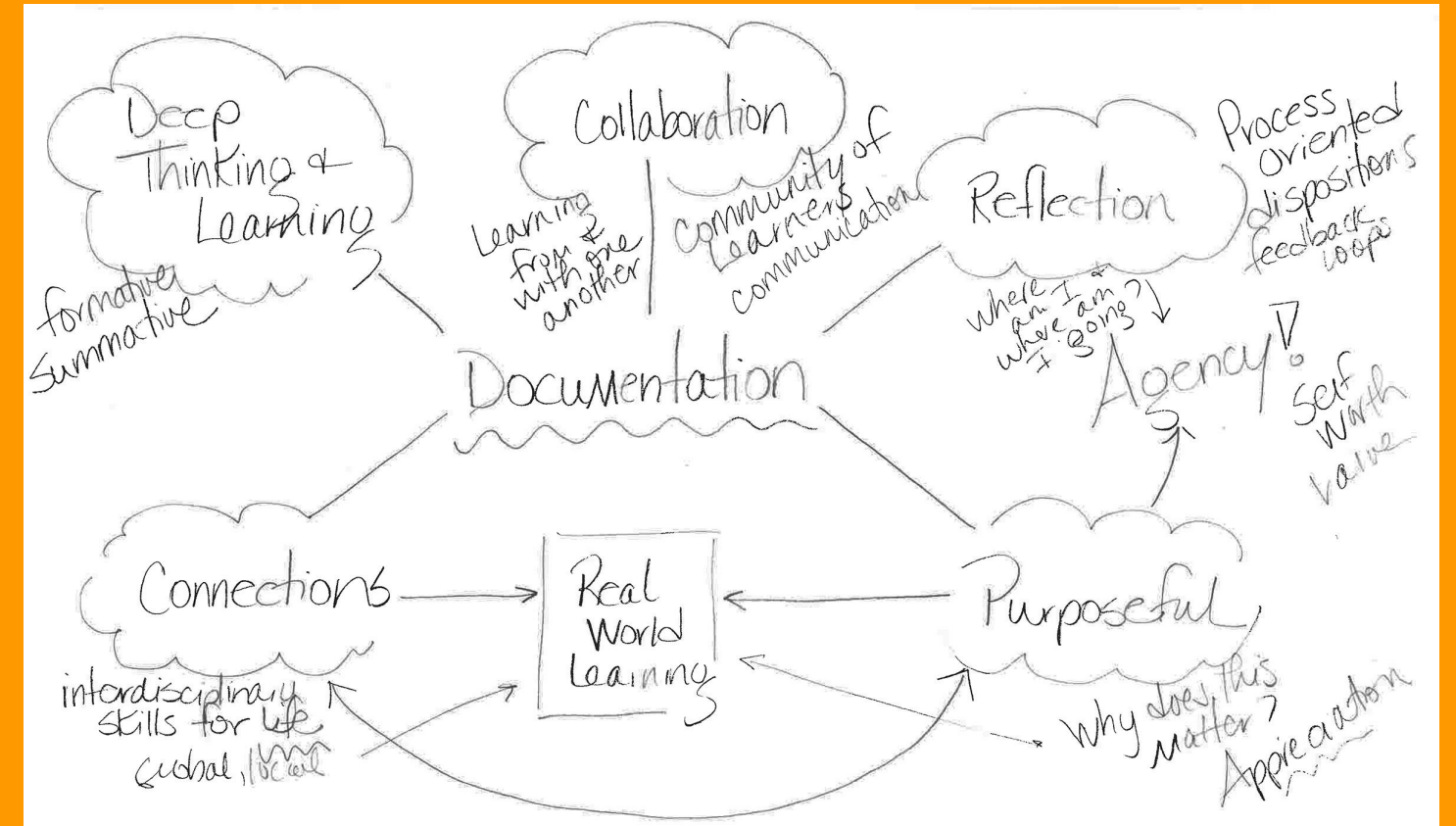
These are the tools used to document or the result of documenting a part of the learning process, i.e. a camera vs. picture.



# Values Concept Maps

Overview of "Values" and common themes:

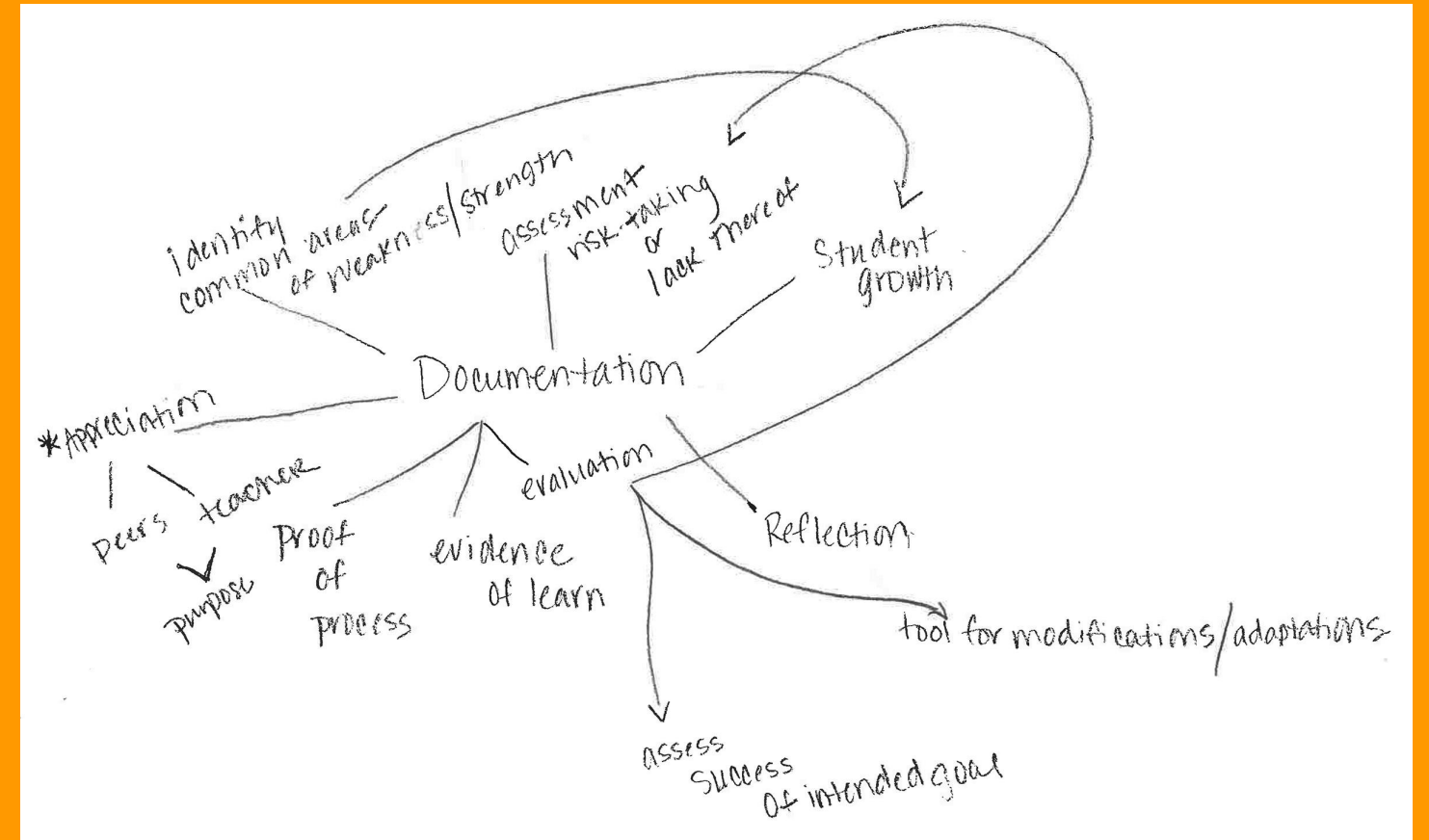
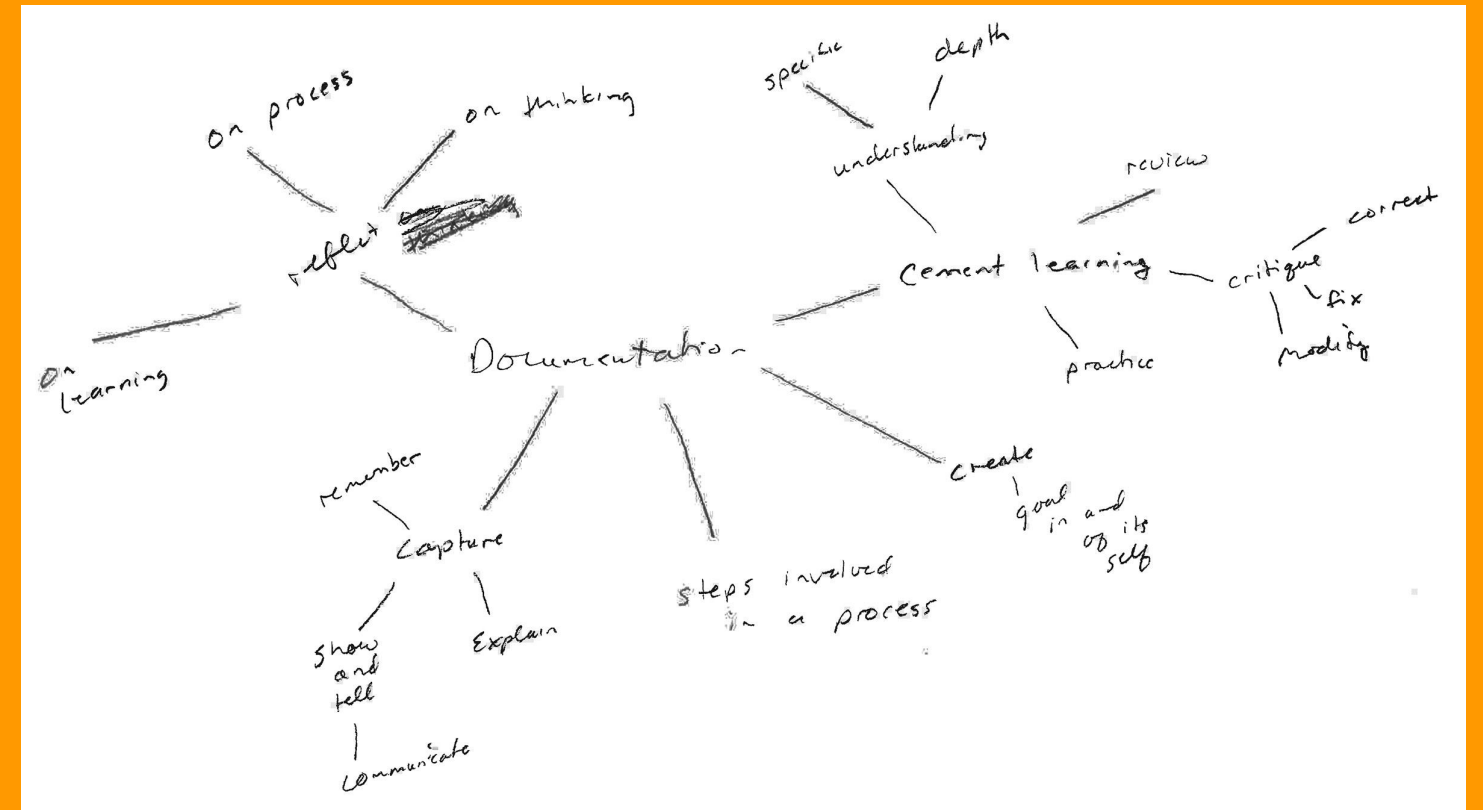
- Support Real World Learning
- Purposeful Documentation
- Build Appreciation
- Collaboration
- Connections through Interdisciplinary Thinking
- Learner-Centered
- Teacher-Centered
- Scalable Practices
- Validation of Process/Outcomes
- Relevance in "Big Picture"



# Process Concept Maps

Overview of "Process" and common themes:

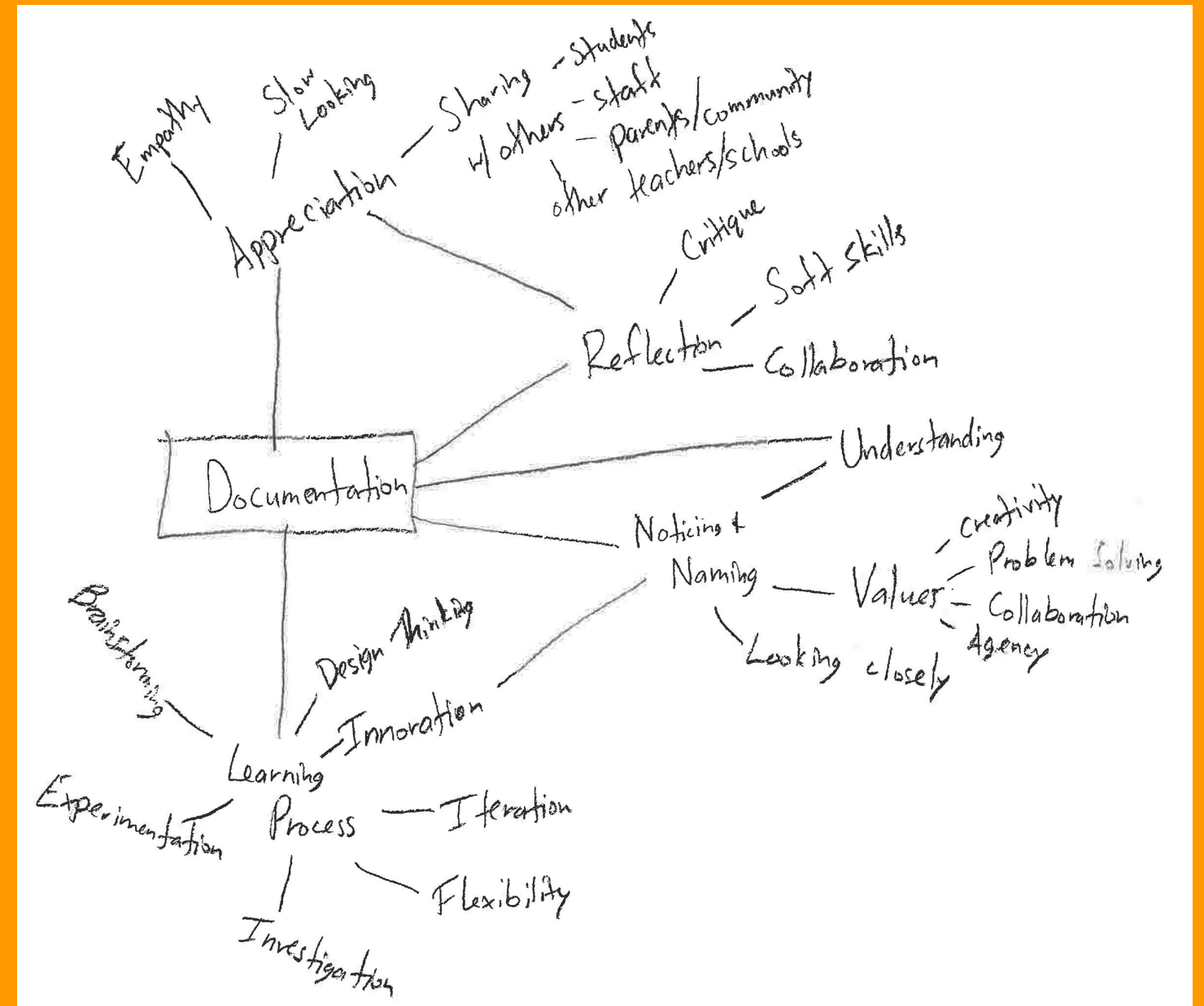
- Able to Share, Sharing with others
- Notice and name
- Slow looking, looking closely
- Reflection; on thinking, on process, on learning
- Identify areas of weakness/strength
- Assess success of intended goal; Assess worth to others
- Feedback to inform decisions
- Critique



# Outcomes Concept Maps

Overview of "Outcomes" and common themes

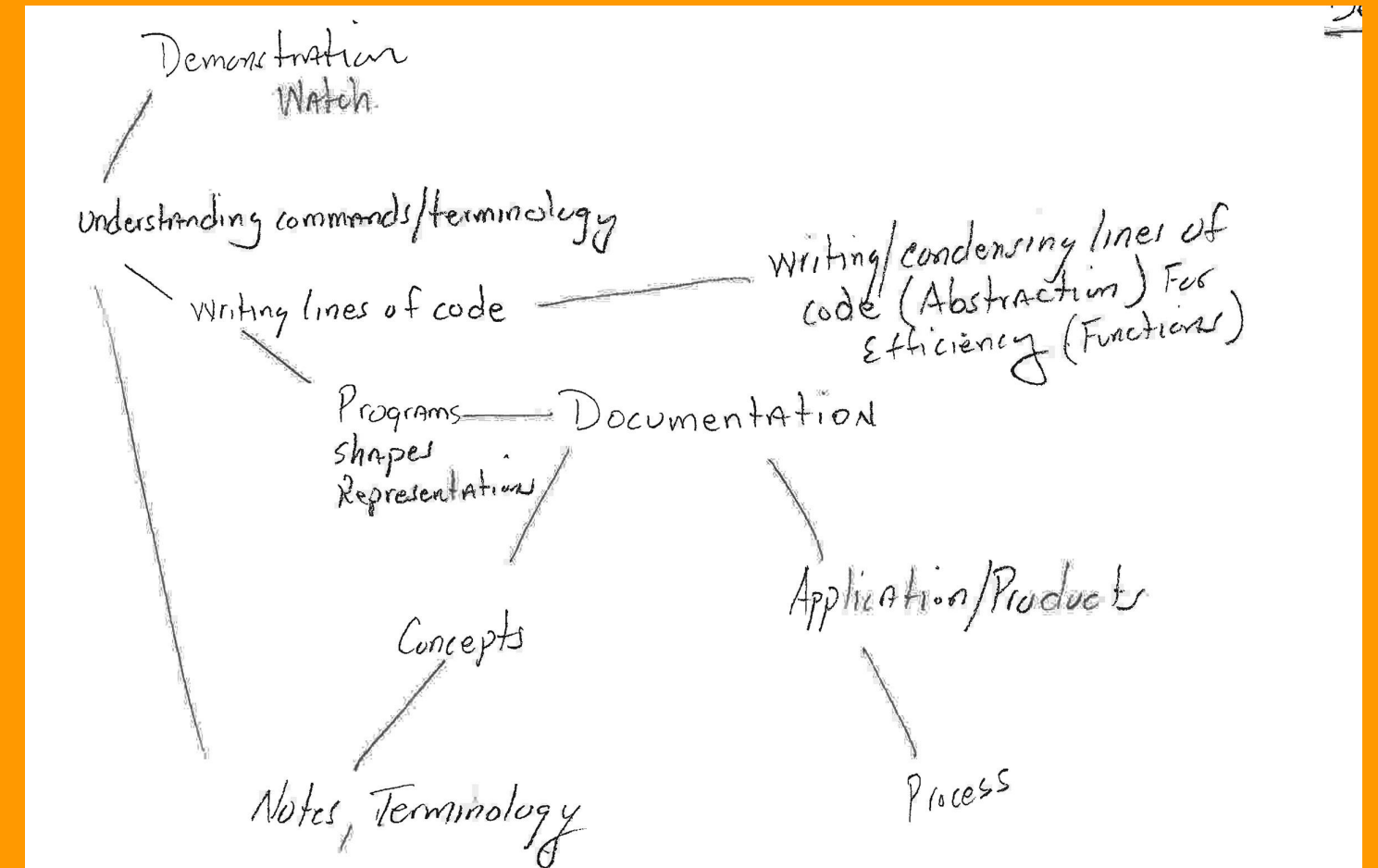
- Deep thinking and learning
- Self-worth and value; Agency
- Take risks, Tenacity
- Time and stress management
- Problem solving skills, creativity
- Flexible thinking
- Design thinking skills; Able to iterate/experiment/innovate/brainstorm
- Understanding
- Student Growth



# Tools & Evidence Concept Maps

Overview of "Tools & Evidence" and common themes

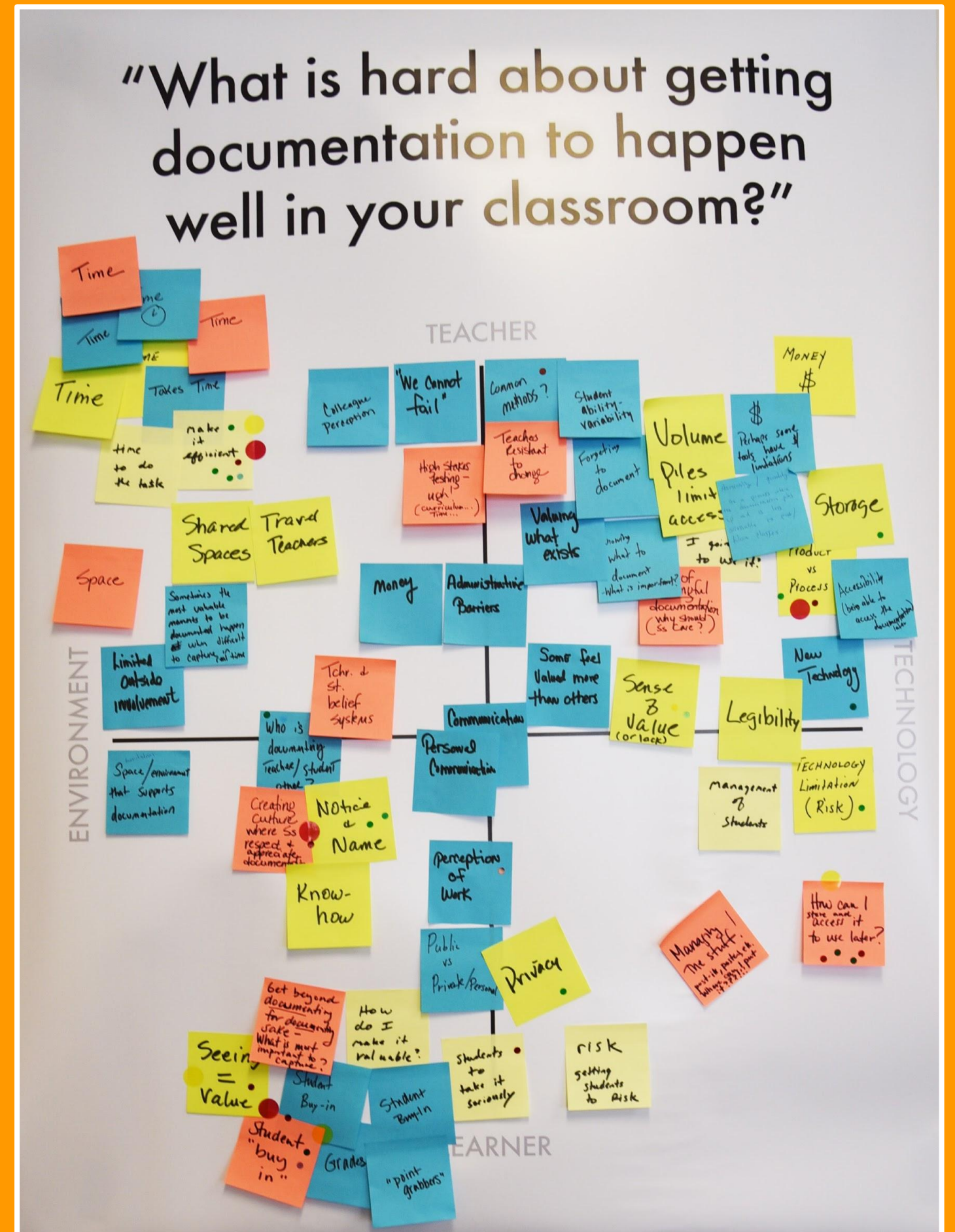
- Artifacts
- Evidence, Evidence of Learning
- Proof of process
- Evaluation, Assessment
- Tool for modification
- Record of experience
- Portfolios, blogs, journals, web-based
- Lesson design, video
- Programs, shapes, representations
- Notes, terminology
- Photo, sound, virtual/VR, products, paper and pencil



# Key Paint Points

As part of the workshop, we asked participants to share the key challenges they have observed to getting students to adopt good documentation practices. The goal was to learn what aspects of their teaching spaces, cultures of documentation, and infrastructure create friction for documentation. Below we highlight some of the problems commonly mentioned by this group:

- **Dedicating Time + Space:** Educators often have to negotiate their time to allow students the opportunity to document their work, which can often not be efficient or convenient, “sometimes the most valuable moments to be documented happen when it’s difficult to capture in real time”. Several teachers also shared that they move often and share teaching spaces due to their roles at Quaker Valley, and this can lead to the need for more nomadic documentation practices and infrastructure.
- **Educators Modeling Practices:** Educators shared the importance of creating a culture around documentation practices that can support student learning in similar ways to how they’ve adopted *Agency By Design* and other frameworks (i.e. “making thinking visible”, “naming and noticing”). They find value in teachers adopting documentation practices themselves as models for students to help foster a documentation culture and support student buy-in.
- **Students Seeing Value of Documentation:** Actually creating student buy-in for documentation can be a challenge. A barrier to documenting can often be students not interested or not seeing the value of documentation, often trying to be “point grabbers” looking for ways to maximize their grade than learn about their own learning process and help improve it.



# Key Paint Points

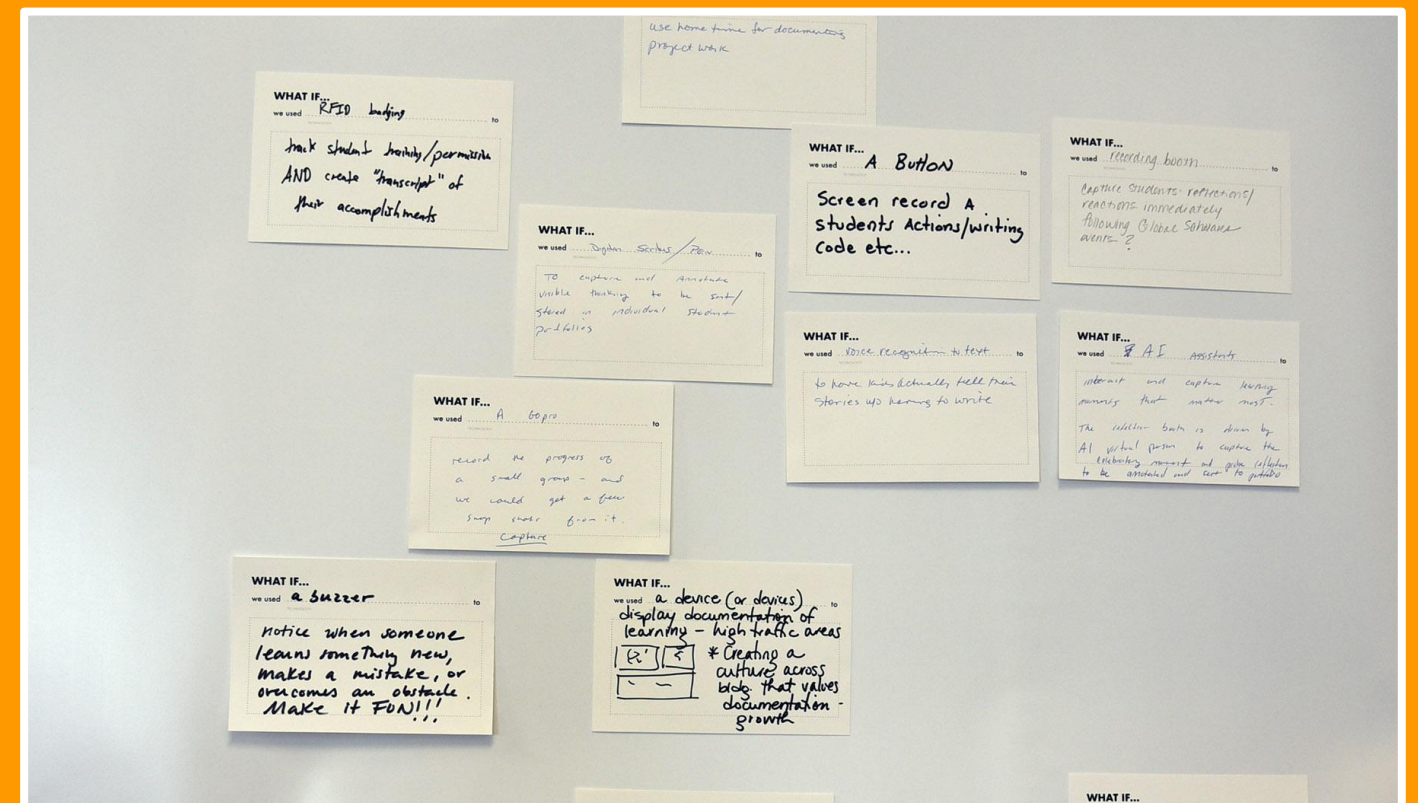
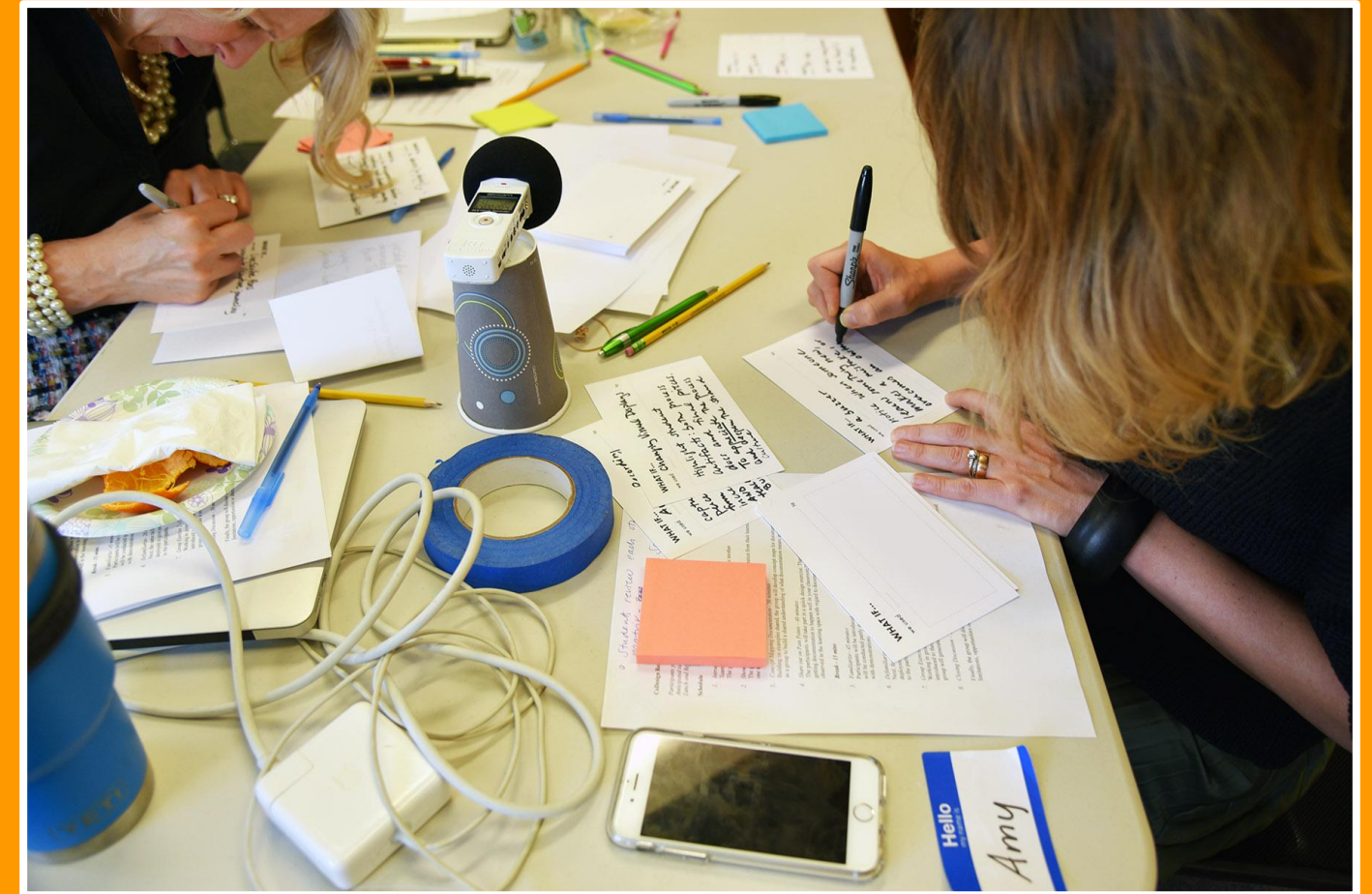
- **Student Documentation Capabilities:** Once students have by-in and want to document, they need to learn documentation skills, which requires time, scaffolding, and resources. Students can forget to document, have limited access to technology, and vary in their ability to articulate, reflect, etc. as they naturally differ in their learning abilities.
- **Storage + Management:** Sometimes less can be more, and the QV educators noted that too much media generated through documenting student work can be unwieldy and lead to nothing being done with the content. In addition, the media that is collected and the way it is collected can sometimes lead to illegible content. How can students and teachers collect just enough data that it can be helpful and manageable AND of high quality?

# What If...

Core enabling technologies and possibilities for maker based documentation were introduced as a curated set of videos and projects. This included RFID check-ins, celebration buttons, timelapse and camera based tech, and video reflection booths, for example. Building on this, participants were asked to share inspirational resources and speculate on how these technologies might be embedded into their learning spaces.

After analysis of the concepts presented by the participants, we identified six common themes:

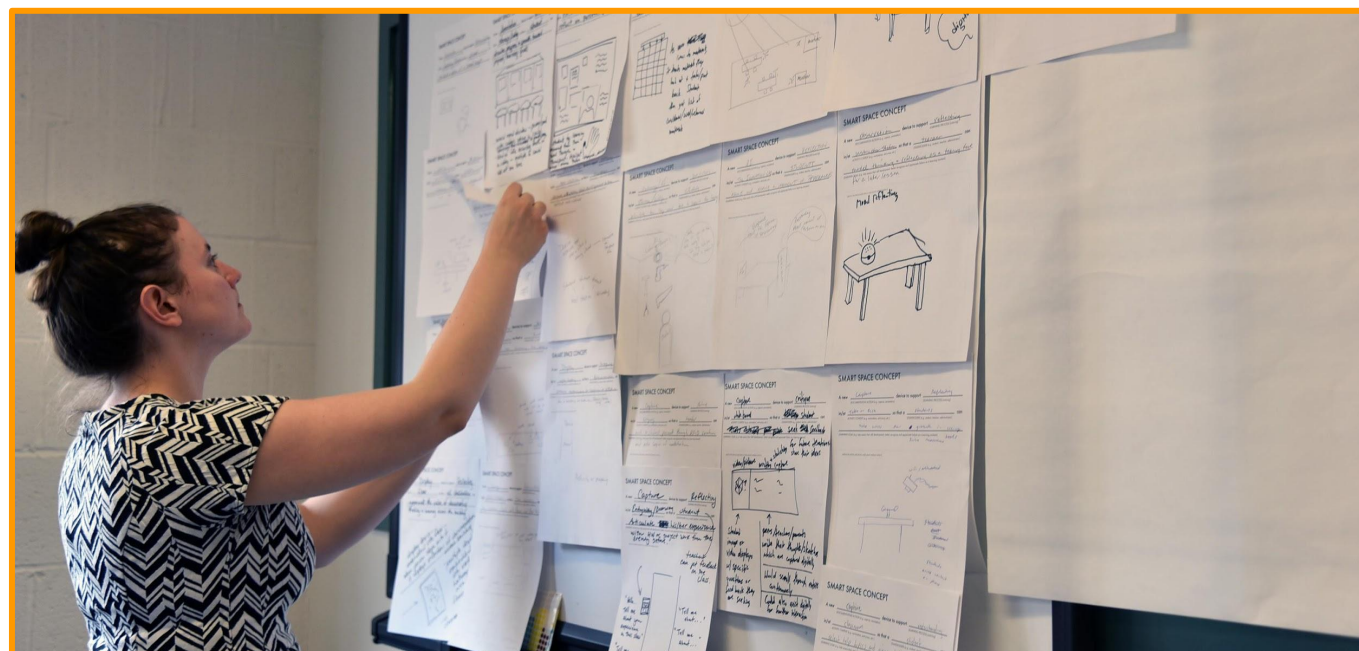
1. Noticing Buttons: notice and reflect in/on important moments
2. Documentation Station: capture work, articulate ideas, and reflect
3. Scribe Pen: capture analogue drawings and writing digitally, with audio
4. Live Wall: display work to reflect on and acknowledge process
5. Timelapse Video: capturing progression of work/ideas over time
6. Voice Capture & AI: scaffold and capture reflection and critique processes with "agent"



# Concept Brainstorming

Following this, a set of thought provoking examples that might be applied in makerspaces and learning environments were presented. These included roving documentary robots, wearable cameras, tables that listen to conversations, and cameras that automatically transcribe what they see.

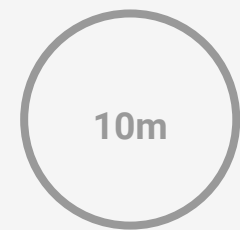
Participants were then asked to imagine new and different ways that technologies might be creatively deployed in your classroom to help improve documentation through a card-based forced-brainstorming exercise.





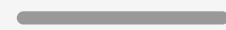
# Design Opportunities

# Workshop 2 Process and Goals



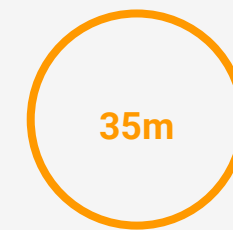
## Share out

Researchers present back ideas generated and shared from the first co-design workshop



## Prioritize

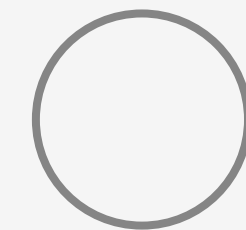
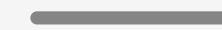
Participants help prioritize the ideas that resonate the most with their organization



## Contextualize

Participants help contextualize the ideas they prioritize by imagining who uses the technology, when, where, and why.

*Concept Generation*



## Formulate Concepts

Concepts generated from the workshop will be used to create storyboards and more detailed concepts to share back in Workshop 3

## Purpose

- Verify ideas collected are of value to site stakeholders
- Prioritize ideas that can have the most impact and buy-in from the site stakeholders
- Build understanding about the context in which the technology will be implemented to help inform design

## Intended Outcomes

- Narrow design concepts to 4-5 options for further development
- Collect more contextual information about the technology location, frequency of use, and integration into classroom practice
- List of design needs to consider for this site's context (i.e. facilities, stakeholders, culture, etc.).

# Summary of Concepts

Quick Wins

## Naming & Recognizing Buttons

A high tech way to capture and name important moments in a process.

## Live Walls

Large-format displays to showcase digital work and make inspirations visible.

## Digital Scribe Pen

Writing instrument that captures handwritten marks digitally and can capture related audio.

## Timelapse Lamp

Overhead timelapse video or series of photos that capture students working, to support reflection and staying on task.

New Propositions

## Video Review Booth

A space to record first person video responses about current work and experiences.

## 'Modeling' Cameras

Cameras to capture educators completing tasks for students to model and capture themselves to demonstrate competencies.

## Tools with Histories

Media connected to tools and materials that aid students in the completion of tasks.

Blue Sky Ideas

## Personable Chatbot

An AI device that engages learners in conversations to share reflective thoughts on their work and the work of others.

## Nomadic Audio Capture

Audio device that can travel from different students and classrooms to record audio for reflection.

## Hi-Tech Expert Feedback

Technology that offers students guidance from experts or "expert models" through VR or AI.

## Learner Tracker

Devices that track various student movement, time spent on task, and attitudes to encourage positive work habits.

# Naming & Recognizing Buttons

Participants shared five concepts that related to interactive tangible buttons. There are a variety of potential enactments of this technology - from pushing the button that records a moment of success through a process, to a button that prompts a student to name the learning they notice. Whatever the format might be, at its core this idea represents a desire to make accomplishments visible, to recognize students during moments of success, and to create a culture where the learning community is attentive to and supportive of each other's wins, big and small.

WHAT IF...  
we used a buzzer to

8

notice when someone learns something new, makes a mistake, or overcomes an obstacle.  
Make it FUN!!!

WHAT IF...  
we used celebration buttons to

22

notice and name the learning we value most and document that celebratory moment with student reflections.

WHAT IF...  
we used a button to

20

help annotate / capture ~~success~~ problems to be overcome.

WHAT IF...  
we used push button to

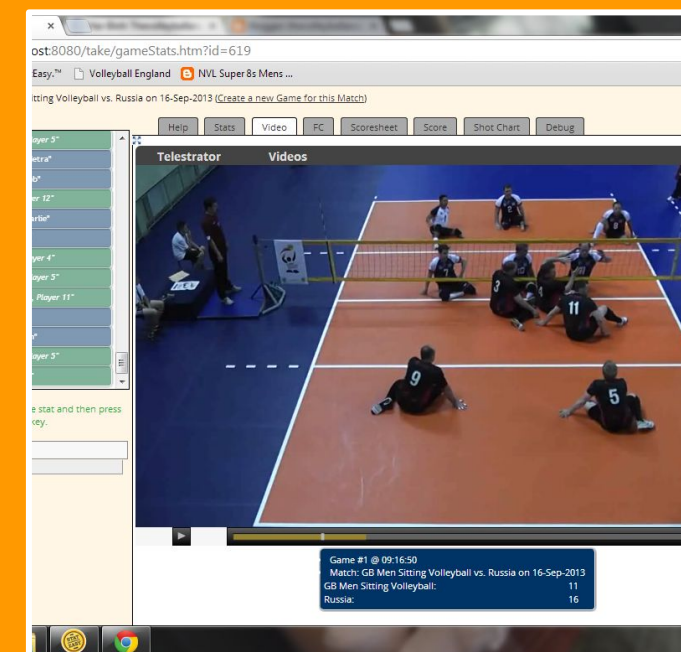
15

encourage students to "name + notice" / show appreciation for the efforts of their peers?

WHAT IF...  
we used push-button to

24

capture student designs/ideas at multiple stages of process



Precedent Project  
**StatEasy**

<http://stateasy.com>

The StatEasy application allows teams to record game content, take stats, and synch stats directly to video content. For instance, users can click on a player's failed attempt in the stats view and bring up the video associated with the failed attempt. The technology allows teams to easily compile video that can be used to help players improve by visually understanding what may lead to successful and failed physical tasks.

**WHAT IF...** (14)  
 we used web/Displays / Projection to  
 store and maintain visible thinking so that it can be accessed at anytime and in any amount matter.

**SMART SPACE CONCEPT** 13  
 A new Display device to support Reflecting  
 in/at floor so that a all stakeholders can  
 appreciate the value of documentation thinking & learning across the building

display device embedded into floor - when person steps on to it it displays reflections of documentation - Multiple devices embedded into each hallway area / flooring - in classrooms?

**WHAT IF...** (9)  
 we used a device (or devices) to display documentation of learning - high traffic areas  
 \* Creating a culture across bldg. that values documentation - growth

**SMART SPACE CONCEPT** 4  
 A new Display device to support Articulating  
 in/at Floor so that a parents can appreciate the learning that occurs in the room

parents walk across floor and out of panel comes student work

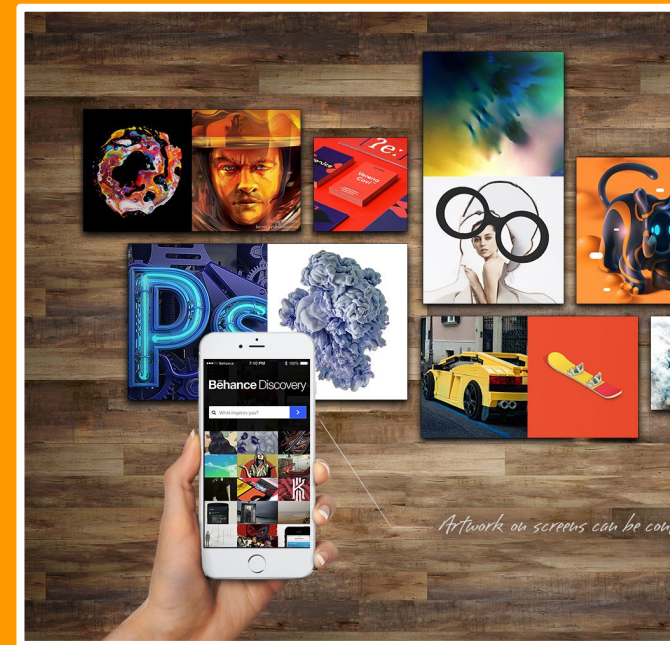
**WHAT IF...** (28)  
 we used Changing Visual Displays to highlight student artifacts: both process docs and final pieces. To appreciate the process and deepen the shared culture

**SMART SPACE CONCEPT** 9  
 A new IDENTIFY device to support NOTICING  
 in/at PIN-UP BOARD so that a student can reflect on personal growth (change)

student articulation of what makes you say that

students try learning moments from their work through a thumbprint - highlight places where their changed, developed

**WHAT IF...** (18)  
 we used AN interactive TV to see what's happening in another class that's relevant to us.



**Precedent Project**  
**Adobe Discovery Wall**  
[getwrecked.com/work/discovery-discovery-installation/](http://getwrecked.com/work/discovery-discovery-installation/)

"Adobe wanted the experience of visiting their HQ to be something truly worthy of the Adobe Brand. So they .. design[ed] & develop[ed] an application delivered via touchscreen video walls and video monitor arrays.... users of the Behance Discovery app can browse the vast collection of amazing creative work produced ... The application is scalable to fit virtually any size screen, or any type of multi-screen array, and has been installed in a variety of configurations within Adobe offices worldwide."

# Live Walls

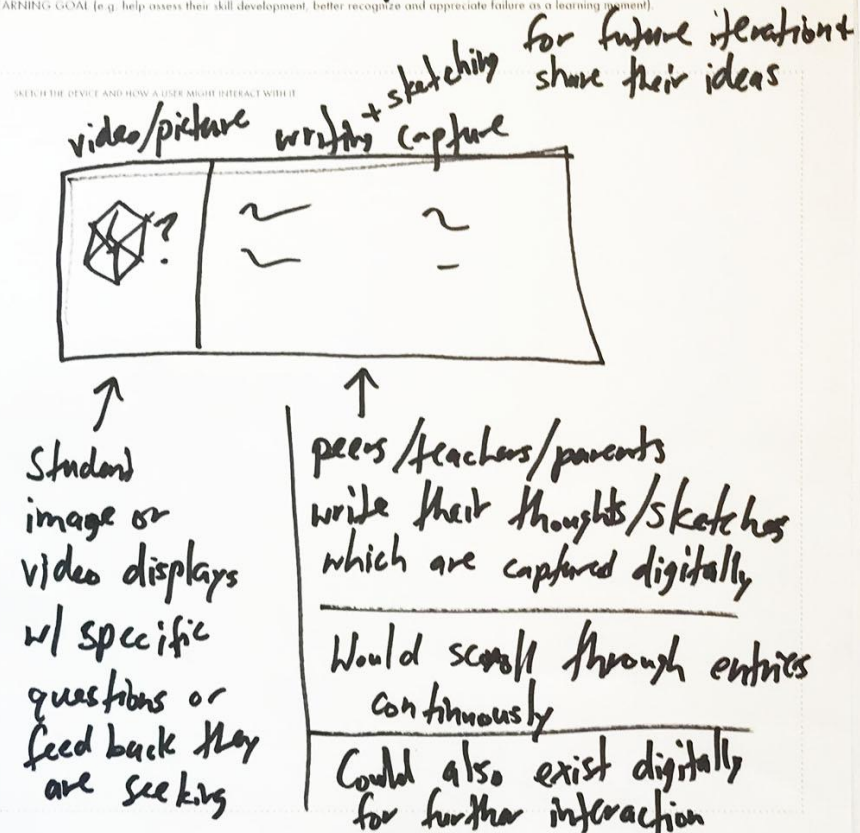
During the workshop, the participants discussed several opportunities for large-format digital displays to enhance students' learning experience. These included: a) an interactive TV displaying relevant student work from another class; b) making progress visible and providing space to annotate and "name" moments; c) a display of process work over a project for students to reflect and see growth; d) projecting work in high traffic areas to recognize, celebrate, and appreciate work; and e) showing feedback on work. *There's lots of possibilities here!*

## SMART SPACE CONCEPT

19

A new Capture device to support critique  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
 in/at white board so that a teacher student can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
~~assess student work~~ ~~peer review~~ seek feedback  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT



29

WHAT IF...  
 we used LiveScribe Pens to  
 annotate/capture journaling and transfer into digital format to save reflections - capture process

## WHAT IF...

4

we used Digital Scribe Pen to

To capture and Annotate visible thinking to be sent/stored in individual student portfolios

25

WHAT IF...  
 we used tracking pen to

show students how/why ideas/prototypes changed over time

\* would this cause them to "hold back"?

21

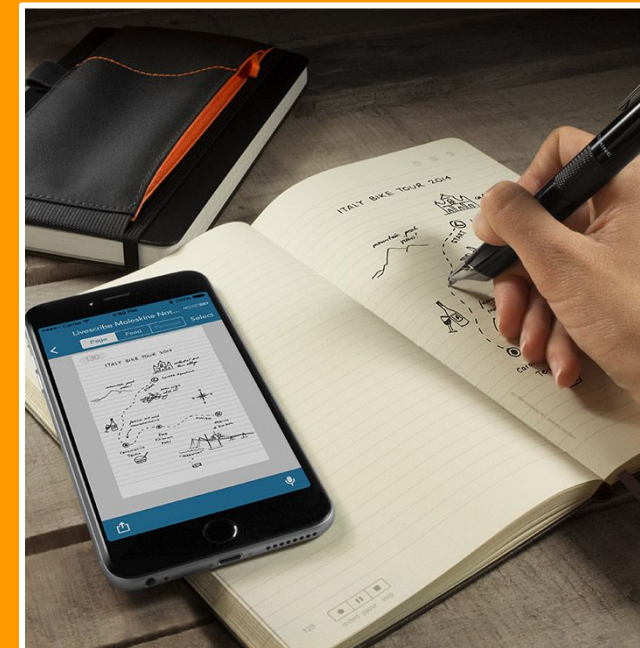
WHAT IF...  
 we used Pen → digital tool to

Capture drawings (and verbal thinking) to be then saved for future discussion.

Display - also manage - multiple drawings

# Digital Scribe Pen

There's a lot of analog work that occurs in a classroom to help brainstorm, iterate, and plan work. These actions can happen in notebooks, on paper, and on whiteboards - independently or collaboratively between peers and/or instructors. This work is necessary and helpful but often needs to move into a digital space, e.g. documenting a thought, reflection, or description to use for a final report. Digitizing work is helpful but cumbersome. The group imagined that new tools could help digitize learner's notebooks and notes to seamlessly move them into digital spaces and support making thinking visible.



Precedent Project

## Livescribe Pens

<https://www.livescribe.com/en-us/smartpen/>

Designed to work and write like a premium ballpoint pen, the Livescribe 3 smartpen uses Bluetooth Smart to send everything you write to your smartphone or tablet.

Livescribe notebooks feature an innovative dot pattern that tells the smartpen precisely what you've written or drawn. Livescribe paper is available at competitive prices in a variety of sizes and styles, and can even be printed for free with a laser printer.

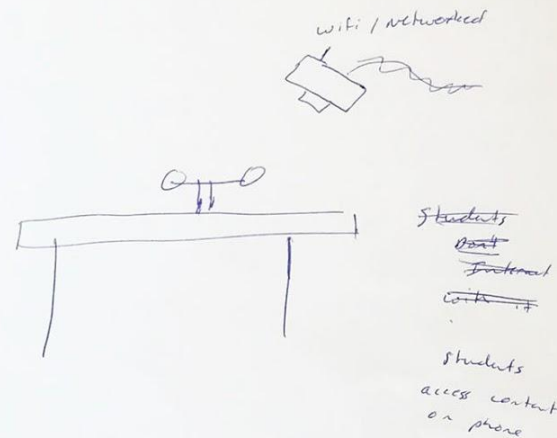
## SMART SPACE CONCEPT

A new Capture device to support Reflecting  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at Table or Desk so that a students can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

help assess their growth in using  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment) tools.  
Science measurement

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT



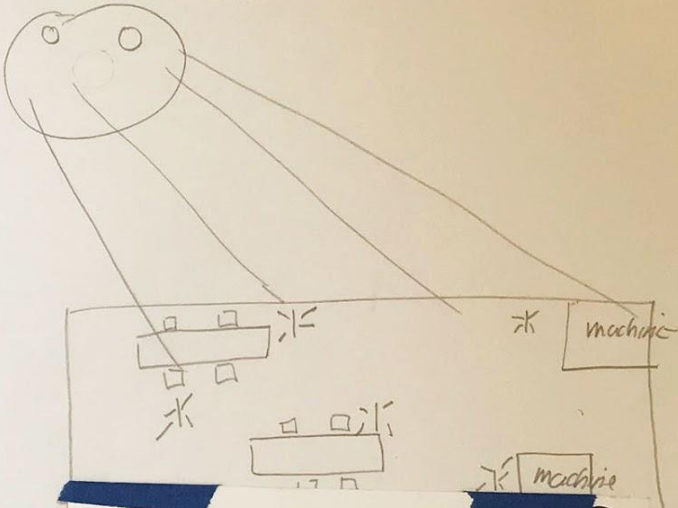
## SMART SPACE CONCEPT

A new Observe device to support Critiquing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at Fabrication Area so that a teacher  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

Assess productivity in a lesson  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT



WHAT IF...  
 we used A Button to

Screen record A students Actions/writing code etc...

WHAT IF...  
 we used A Go pro to

record the progress of a small group - and we could get a few snap shots from it.  
 Capture

WHAT IF...  
 we used A Go Pro to

document a class activity

WHAT IF...  
 we used times to to

take periodic photos as making or doing occurs (no one has to remember to do it) then time lapse result

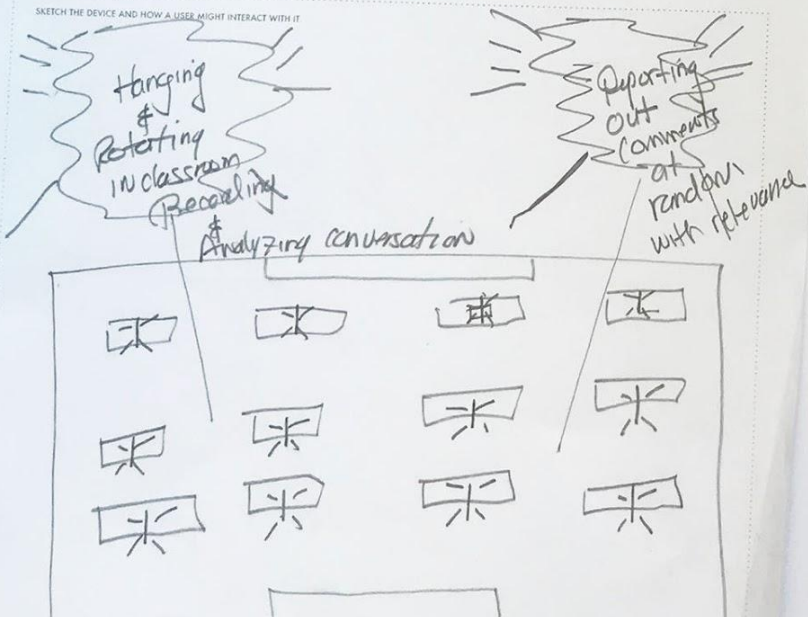
## SMART SPACE CONCEPT

A new Identifying device to support Critiquing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at Entire Classroom so that a students and teachers can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

Reflect on something that was built to help see how it impacts the class  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT



# Timelapse Lamp

The group generated many ideas that contained overhead cameras and/or timelapse video to capture students' process without extra initiative on a student's part. These technologies free up students and teachers for remembering to capture documentation, and can easily be integrated with buttons or other annotation tools to make sense of the media generated. Not only do the video and pictures help document student work, but they can also help teachers "assess productivity in a lesson", "reflect on something built to see how it impacts the class", and "record the progress of a small group".



## Precedent Project Brinno Timelapse Camera

<http://brinno.com>

It "performs time-lapse photography and instantly creates HD videos at 1280 x 720 resolution from the captured still images. .. Choose a time interval of 0.3 sec or select one of many intervals from 1 sec - 24 hr to see change over time, whether you're recording events, projects or the natural world. There's also a setting for shooting 3-5 photos in 1 sec. Videos are compressed into smaller files for easy playback on smart devices.

SMART SPACE CONCEPT

8

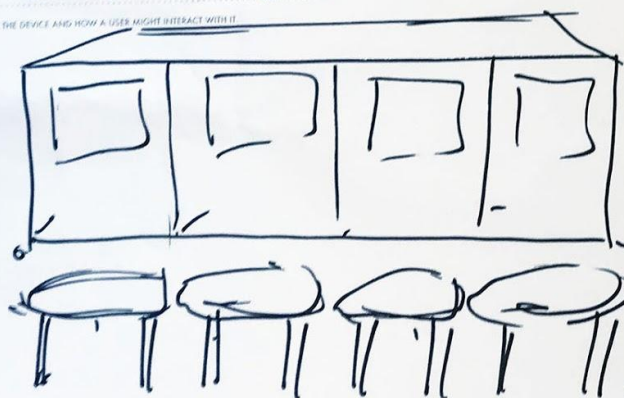
A new annotate device to support noticing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
 in/at Floor so that a Student can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
look closely  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)



SMART SPACE CONCEPT

2

A new Annotation device to support articulating  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
 in/at Storage cubby so that a student can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
describe progress + growth toward project/learning goals  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)



- would need dividers - privacy/sound  
 indiv. cubbies where ss could  
 record their articulations of growth/prog.  
 - kind of like recording booth in  
 a cubby - multiple ss could  
 use at one time

WHAT IF...

27

we used Audio Recording to  
 capture students thoughts, perceptions & understandings from an experience to increase their self-awareness AND share it out to inform teachers & other students - BUILD EMPATHY

WHAT IF...

26

we used Recording booth to  
 prompt students to reflect on process/learning/skills + successes of others

WHAT IF...

16

we used a documentation station to capture each student's journey through a learning process  
 • Growth  
 • Appreciation - Value

WHAT IF...

3

we used recording boom to  
 capture students reflections/reactions immediately following Global Scholars events?

# Video Review Booth

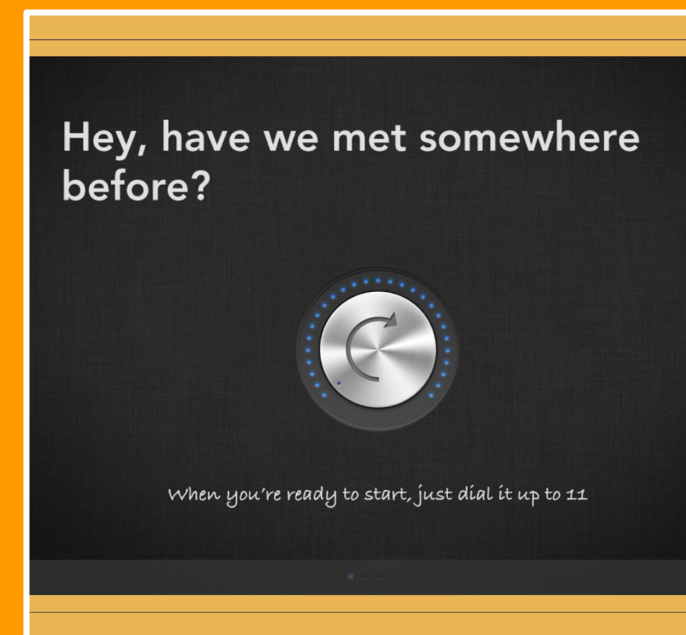
Several ideas from the group focused on a dedicated space or "booth" in the classroom where students could go to reflect on their process, see their growth, and increase their self-awareness. Most concepts involved audio recording of students sharing their thoughts and an enclosed space or area demarcating a private, personal space for student to have privacy and allow sound to be hopefully mitigated for the audio recording.

Precedent Project

## Probatron

Kelliher, Aisling and Byrne, Daragh. Research through Design, Documentation, Annotation, and Curation.

The Probotron is an experience capture installation which is deployed during an event, conference or symposium. Each visitor to the booth is asked to choose one question from a larger set and record a short one minute response. This offers participants an opportunity to record their account of the proceedings, or provide a reflection on significance of the event as whole.





## SMART SPACE CONCEPT

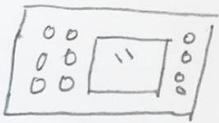
1

A new Annotate device to support Articulating  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at Soldering Station so that a student can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

to build a replica of a learned concept.  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT.



WHAT IF... A Display (13)  
 we used A Display to

Showcase student work;  
 Show how to complete a task  
 (1 min Video)  
 Time Lapse Product Production  
 Help topics - kark

## SMART SPACE CONCEPT

A new identifying device to support noticing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at tool station so that a teacher can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

attribute noteworthy skill development to the correct individual  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT.

Device notices tool use + who is doing what — connects to student file

Student student student  
 \ / \ / \ /  
 tool station (all working)

# 'Modeling' Cameras

Two related themes emerged from the workshop that support (1) students modeling a task to demonstrate competency and (2) teachers modeling a task to demonstrate an "expert" process. In the three examples to the left, **student work is tracked and recorded** as a record of their accomplishment to provide as evidence of their mastery, and in some cases, as a "how to video" for future learners (i.e. "show how to complete a task", "attribute noteworthy skill development to the correct individual", and "build a replica of a learned concept").



### Precedent Project

## Snapchat Spectacles

<https://labs.ideo.com/2017/06/14/how-we-did-it-snapchat-enabled-safety-goggles/>

These spectacles have a built-in camera that can record up to 10 seconds of video from the viewpoint of the wearer. Dave Vongle of IDEO hacked them to become shop safety goggles: "If I could modify Snapchat's Spectacles into a pair of safety goggles, I could document our projects without ever picking up a camera." This lets them easily post work in progress, save videos for documentation, and create structured build logs and instructable guides.

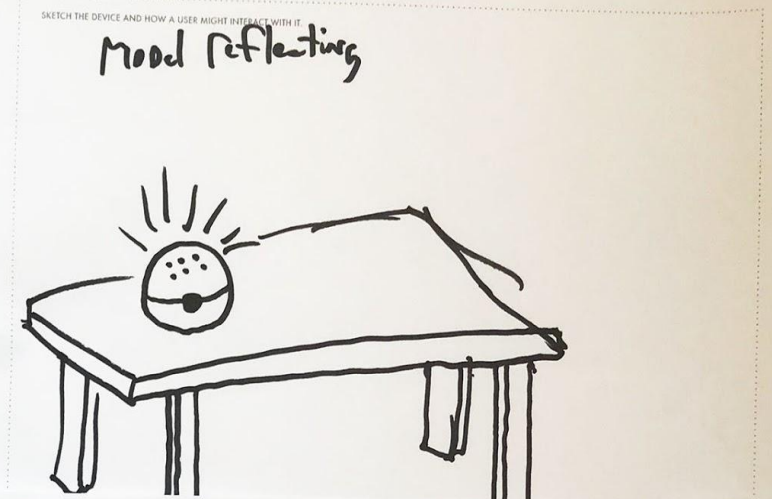
## SMART SPACE CONCEPT

16

A new Observation device to support reflecting  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at Instructor station so that a teacher can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

model thinking & reflecting as a teaching tool for a later lesson  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).



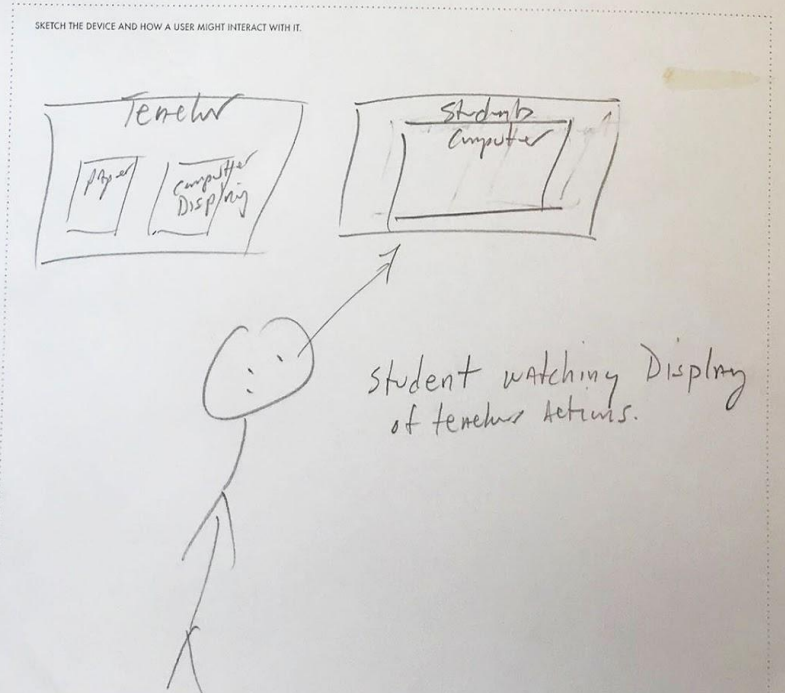
## SMART SPACE CONCEPT

5

A new Display device to support Noticing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)

in/at Entire Classroom so that a student/teacher can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)

understand the process for producing a product through demonstration of multiple mediums  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).



# 'Modeling' Cameras

These two concepts contain technology that help teachers model reflection practices or a production process to scaffold new tasks for students (i.e. "student watching display of teacher actions" and "model thinking and reflecting as a teaching tool for a later lesson"). Teachers can use other technology, such as audio recorders or the "timelapse lamps" to create content that can then be shared with students in unique ways.



Precedent Project

## Nord Projects Lantern

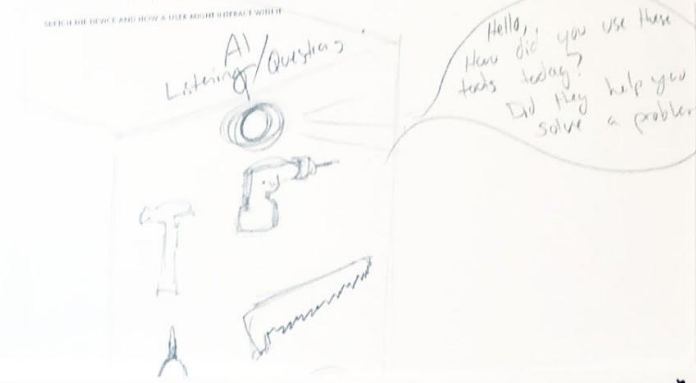
<http://nordprojects.co/lantern/features>

The Lantern project uses raspi technology coupled with a hacked IKEA lamp to provide an AR experience, which projects different "channels" that are connected apps that display data feeds, "projections form peripheral, ambient, ephemeral displays, which can enhance real world objects and spaces with useful, beautiful data." The data displayed could be video of teacher performing a task, or feedback from peers through social media.

## SMART SPACE CONCEPT

14

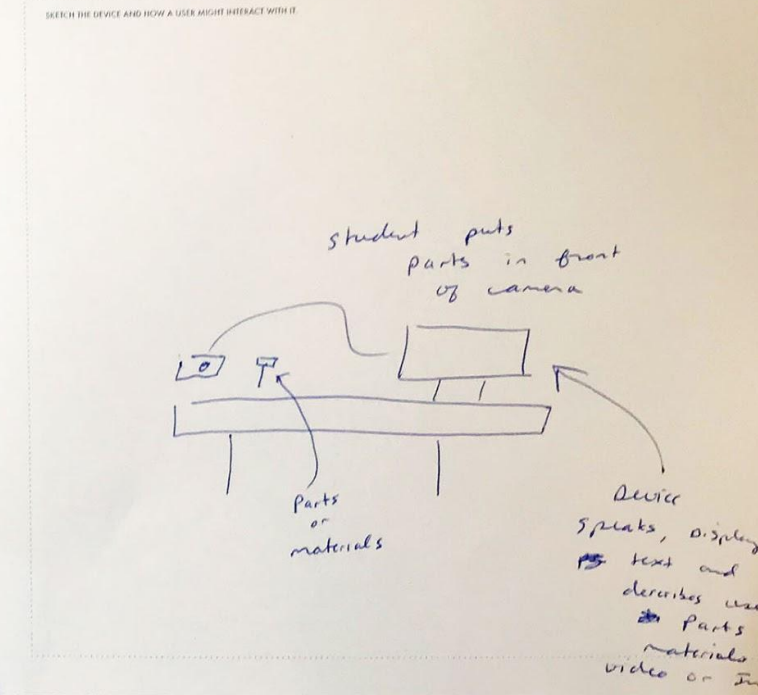
A new Learning/AT device to support REFLECTION  
(DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing))  
 in/at Storage/lobby so that a Students can  
(ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator))  
articulate how they used tools to support their learning  
(LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment))



## SMART SPACE CONCEPT

18

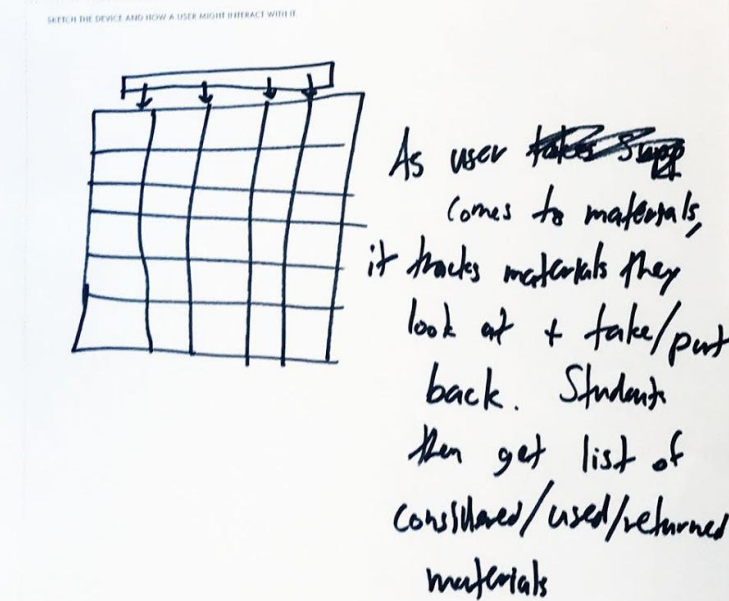
A new Identity device to support Critiquing  
(DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing))  
 in/at Materials or Parts Bin so that a Students can  
(ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator))  
understand the purpose of complex parts and their effectiveness.  
(LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment))



## SMART SPACE CONCEPT

12

A new observation device to support reflecting  
(DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing))  
 in/at materials or parts bins so that a Student can  
(ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator))  
take risks + learn from failure  
(LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment))



# Tools with Histories

Participants shared three concepts related to material and tool usage, and ways the tools and materials themselves can help teach students how to use them by documenting past usage. One idea explored ways **material and tool usage could be tracked** so individual students can see their patterns of usage and be encouraged to **take risks** exploring new materials and tools. Two ideas considered ways **tools can share information about how they have been used in the past** - the two parts to this concept are (1) technology for students to record their usage “*How did you use this tool today?*” and (2) technology to share recordings to the next student, “*device speaks, displays text and describes use*”.



Precedent Project

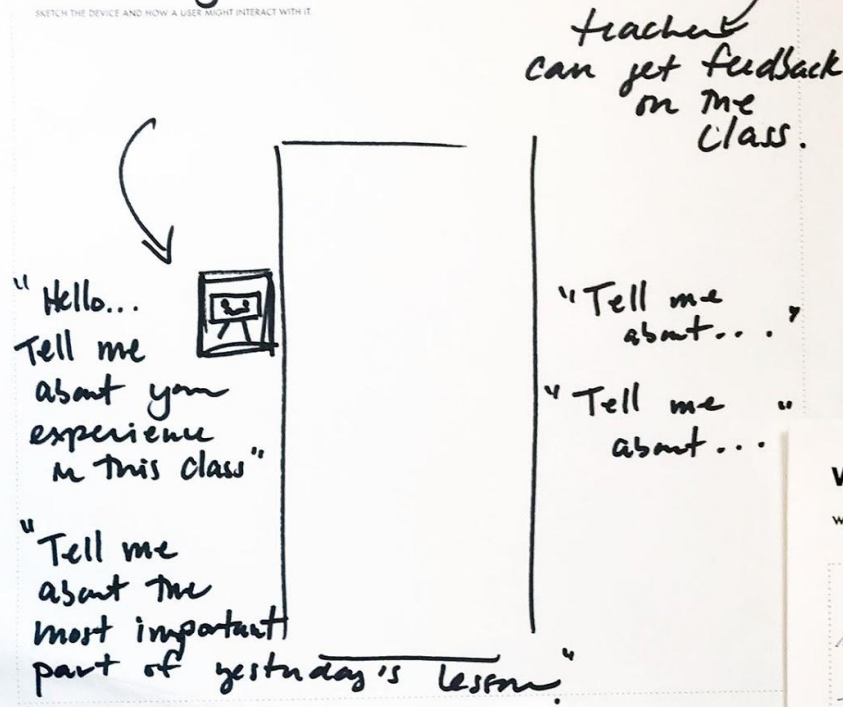
## RFID Smart Cabinets

<http://www.southwestsolutions.com/>

“Medical device inventory control is easily accomplished with RFID Smart Cabinets for procedure room storage. Logitag RFID Smart Cabinets allow hospital staff to know when medical devices are checked out, what patient used a device, and the expiration dates of devices to better manage costs. From Smart Cabinets to RFID medical supply inventory systems, we can help you design and install inventory control systems in make your medical facility efficient”

## SMART SPACE CONCEPT

A new Capture device to support Reflecting  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
in/at Entryway/Doorway so that a student can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
Articulate his/her experience  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).  
with HW or project work from the evening before.



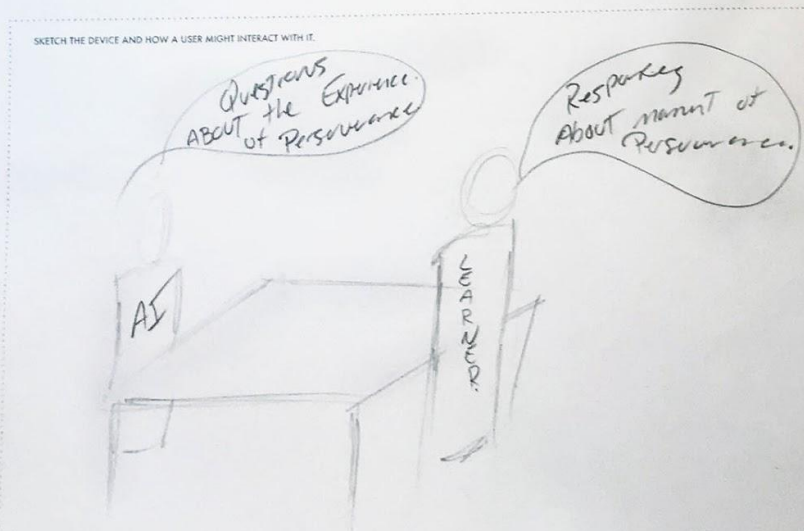
### WHAT IF...

we used AI Assistants to  
interact and capture learning moments that matter most.

The reflection bot is driven by AI virtual person to capture the celebratory moment and probe reflection to be annotated and sent to portfolio

## SMART SPACE CONCEPT

A new AI device to support REFLECTION  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
in/at The Innovation Lab so that a STUDENTS can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
Name and Notice a moment of PERSISTENCE  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).



# Personable Chatbot

Personable AI assistants were explored in three design concepts, where a chatbot technology is configured to elicit natural conversations with learners about their work. One concept considered how the beginning or end of class time can be good moments for reflection, whether on what you completed last class or that day. Another concept looked at how moments of difficulty that require persistence could trigger a chatbot to help students reflect on that event. In all cases, a big component of the AI assistant is its **natural language processing** to make the conversations more comfortable for students.



### Precedent Project

## Boxie the Robot

[https://www.youtube.com/watch?v=19KwSO\\_SBhw](https://www.youtube.com/watch?v=19KwSO_SBhw)

To investigate these questions, a robot was built that facilitated interaction and documentary gathering within an ubiquitous media framework. We then let the robot roam freely, with the goal of capturing stories about its environment. This was done by leveraging human mobility and intelligence, as the robot relied upon people to move long distances and achieve its goals. The end products were a study of how people related to a robot asking for assistance and interaction in various ways, and a set of movies showing the robot navigating the resulting "thread" of a narrative."

# Nomadic Audio Capture

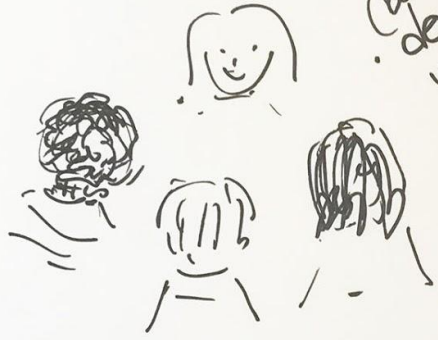
There are many instances throughout a class period when great conversations occur, but no record of them is generated. Three ideas emerged from the workshop that included audio recording that could be transcribed and support different parts of a design process. For instance, one idea captured group conversations that could be during a brainstorming phase and can be reviewed with a teach afterwards. Another idea considered that some students are better at talking than writing, and this tool can support their documentation process. And lastly, an audio device could move from student to student helping them critique their work, learn from moments of “failure”, and identify/tag keywords from the audio.

## SMART SPACE CONCEPT

21

A new Capturing device to support Critiquing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
 in/at Computer/digital so that a students can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
appreciate failure as a learning moment  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT



(beach ball)  
 device that you can move from person to person  
 embed software looking for key words/concepts

## WHAT IF...

we used voice recognition to text to

to have kids actually tell their stories vs having to write

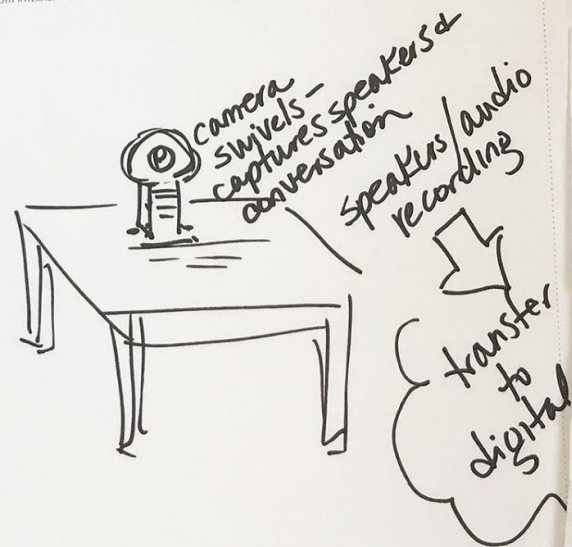
6

## SMART SPACE CONCEPT

24

A new Observation device to support critiquing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
 in/at Table or Desk so that a Administator can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
collaborate with a teacher after observing a class to recognize strengths & areas for future growth  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment)

SKETCH THE DEVICE AND HOW A USER MIGHT INTERACT WITH IT



camera swivels - captures conversation  
 speakers/ audio recording

transfer to digital



Precedent Project

## Listening Table

<https://vimeo.com/121932791>

"The Listening Table is an augmented piece of furniture that hears and understands the conversations happening around it. It is a conceptually dense object, embodying many ideas we have, and values we hold, about the future. By bringing together research and design on connected objects and semantic listening, the Listening Table poses two central questions: How can an object understand the ideas that are being communicated around it?"

# SMART SPACE CONCEPT

23

A new Capture device to support Critiquing  
DOCUMENTATION ACTION (e.g. capture, annotation) LEARNING PROCESS (noticing)  
 in/at Workbench so that a student can  
ACTIVITY CONTEXT (e.g. workstation, entryway, etc.) STAKEHOLDER (e.g. student, teacher, administrator)  
receive feedback throughout the process.  
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).



## WHAT IF...

we used Virtual Reality to

Connect with experts to help us problem solve

# Expert Feedback

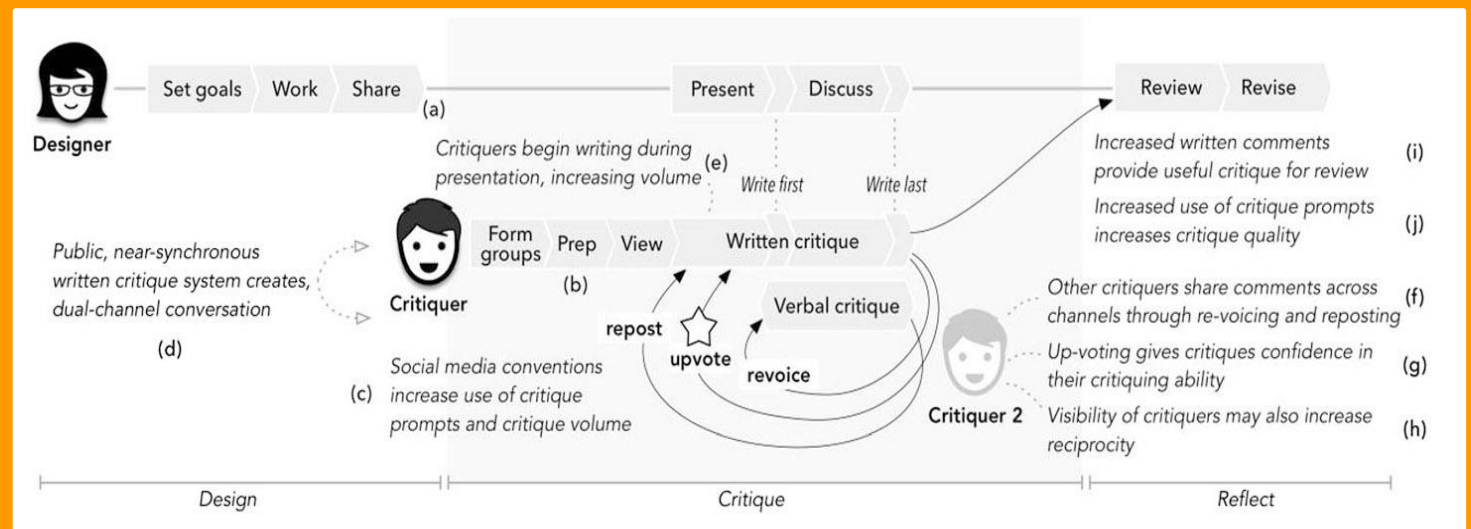
Two concepts centered on the desire to provide students with advice and feedback that can potentially come from experts. One idea considered how virtual reality and other scalable technologies could **connect students with other people, especially experts**, to help them solve a problem. The other idea looked at a way for classroom objects, such as a workbench, to be equipped with technology that provides feedback to learners.

## Precedent Project

### Crowdcritique

<https://www.researchgate.net/publication/310531431/download>

In a paper by Easterday, Gerber, and Rees Lewis, they explored ways to merge face-to-face critique with computer-support to foster better formative feedback. Through multiple studies, they formulated crowd critique design principles for formative feedback, including quick invites, critique training, critique scaffolds, and community hashtags.



## SMART SPACE CONCEPT

6

A new Capture device to support Notice

in/at entryway so that a teacher can

LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).  
make a student present through RFID location and auto login of workstation.

### WHAT IF...

we used RFID badging to

track student training/permissions AND create "transcript" of their accomplishments

10

## SMART SPACE CONCEPT

A new Display device to support critiquing

in/at upon entry so that a Administrator can

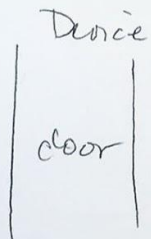
LEARNING GOAL (e.g. help assess their skill development, better recognize and appreciate failure as a learning moment).  
Assess enthusiasm or readiness or attitude for a meeting or activity (facial/body recog. logs.)

### WHAT IF...

we used "check out" equipment to

use home time for documents project work

2



Activity or meeting

# Learner Tracker

Simple infrastructural technologies, such as RFID trackers, are important for implementing most documentation technologies in a classroom. Three ideas from the workshop specifically proposed ways to track (1) **student usage of tools through "checking out"**; (2) track student training to provide access to certain tools; (3) **capture attitudes, readiness, enthusiasm** through facial/body recognition, and (4) track student presence in classroom and login activity.



### Precedent Project

## TechShop RFID

<https://www.forbes.com/sites/jjcolao/2012/10/23/unleash-the-creative-class-build-satellites-jetpacks-and-submersibles-at-techshop/#62cd3eeb423b>

"To make sure novices aren't operating machines beyond their skill level, members scan unique RFID badges to access each piece of machinery." RFID Checkin is commonly used to control access to secured resources. Techshop used this in the context of a makerspace and ensured only certified users could access specific resources. It also creates a detailed record of user activity within the space. Each checkin indicates the relationship between a user, a project, and tools or machines within the makerspace

# Summary of Concepts

Quick Wins

**Naming &  
Recognizing  
Buttons**

**Live Walls**

**Digital  
Scribe  
Pen**

**Timelapse  
Lamp**

New Propositions

**Video Review  
Booth**

**'Modeling'  
Cameras**

**Tools with  
Histories**

Blue Sky Ideas

**Personable  
Chatbot**

**Nomadic  
Audio  
Capture**

**Hi-Tech  
Expert  
Feedback**

**Learner  
Tracker**



# Concept Map Synthesis

## Meaning of Documentation Synthesis

### Values

- ❑ Real World Learning, Connections through Interdisciplinary Thinking, Purposeful, Build Appreciation
- ❑ Collaboration, Learner-Centered, Teacher-Centered, Process Oriented
- ❑ Scalable, Validation, Relevance

### Processes

- ❑ Notice and name, Slow looking, looking closely
- ❑ Reflection; on thinking, on process, on learning
- ❑ Identify areas of weakness/strength, Student Growth
- ❑ Feedback to inform decisions, Critique

### Learning Objectives

- ❑ Deep thinking and learning, Take risks, Tenacity
- ❑ Self-worth and value; Agency, Time and stress management
- ❑ Problem solving skills, creativity, Flexible thinking, Design thinking skills; Able to iterate, experiment, innovate, brainstorm

### Tools & Evidence

- ❑ Artifacts, Evidence, Proof, Evaluation, Assessment, Record
- ❑ Portfolios, blogs, journals, web-based, Lesson design, video, Notes, Photo, sound, virtual/VR, products, paper and pencil

## Pain Points Synthesis

- ❑ Dedicating Time + Space
- ❑ Educators Modeling Practices
- ❑ Students Seeing Value of Documentation
- ❑ Student Documentation Capabilities
- ❑ Storage + Management

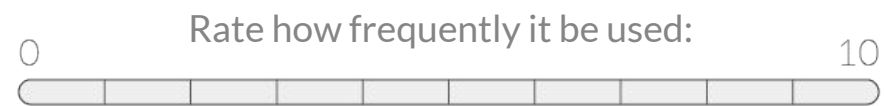
Anything else to add?

# NAME OF TECHNOLOGY

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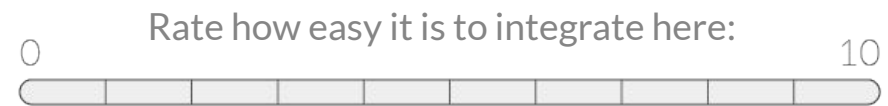
## When

Frequency and Phases



## Where

The Context of Usage



## Why

The Value to Learners

