

Studio in a Box

Digital Media Design E-599 Capstone Project

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1. Introduction

The Studio-in-a-Box initiative is designed to take the “idea” of a production film studio and shrink it down to a scalable form for educational purposes. There are many applications for



Studio in a Box, and the use of the system by users in novel situations is incorporated into the design. Initially, this project was aimed at creating a device that teaching fellows could utilize to produce short videos to supplement

course material, especially for online multimedia courses. In the development of this, I stumbled upon a variety of other uses: a

rehearsal space for faculty as they prepared to film an online course, enabling a media production pathway to constructionist learning experiences in and outside the classroom for students, and otherwise generally democratizing the use of media in all aspects of education.

Utilizing my background in the film industry and the education sector, I adapted and crafted novel preproduction workflows to create production scaffolding for users in a variety of settings. This singular workflow is modifiable and adaptable to any academic situation through the inclusion or exclusion of steps, this will be discussed in detail during the workflow section.

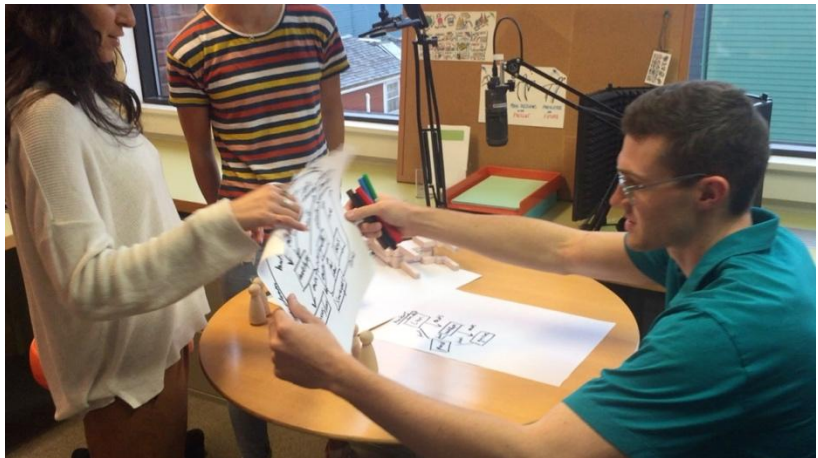
2. Teaching Fellow Aid

Teaching fellow performance is integral to student achievement, they represent the front line in student support, and often include actual teaching as well. Throughout a course (online or brick-and-mortar), the teaching fellow team will be running class sections, moderating discussions and forums, and the point-person for student questions and assistance. Often there will be commonalities to what students find most difficult or confusing, which necessitates the teaching fellows to repeatedly answer a question in a variety of formats to various students. This method is clearly inefficient, and opens students up to variable quality of aid, especially over online courses where communication is already limited. Through interviews and pilots with Harvard faculty and teaching fellows (Table 1), it became clear that for the purposes of teaching fellow aid, the optimal solution would enable the teaching staff to give a singular answer to many similar questions, and to do so in multimedia for both logistical and pedagogical reasons. What emerged from these discussions was that the perfect solution would be to be able to go into a multimedia studio on demand, and be able to quickly, cheaply, and efficiently create a short explainer video or static visual to scaffold difficult material while students are wrestling with it. There were many issues with executing this. Firstly, multimedia studios aren't present at every university and college, especially in low- and middle-income countries. Where there are studios, often these are only available to a select few faculty to use for production, classroom use, or various production needs the greater university has (such as advertisements, or interviews). When a semester has begun, faculty tend to not have the time to dedicate towards all of the logistical input producing a short multimedia product contains (e.g., reserving the space, preparing the material, rehearsing, executing well, guiding the edit,

communicating where the exported product needs to go, etc.). This is prohibitive on their ability to produce media, and doesn't represent a realistic solution. At the same time, teaching fellows tend to lack the clout to reserve such a space, and often there are costs attached to doing so.

It should also be mentioned that teaching fellows are often time-crunched as well, and the time-demands of producing an educational media product, even a short one, are likely beyond that of the average teaching fellow. Further, small, on-demand, niche media products like the ones these teaching teams are looking to produce aren't suitable for contracting an outside company to produce either. Generally some content knowledge is required for the correct message to be installed into the media product, let alone ensuring that multimedia pedagogic principles are followed.

Additionally, these products need to be produced within minutes or hours- contracting an outside service for a production timeframe such as this is unrealistic.



The Studio-in-a-Box provides an opportunity for the teaching fellows to produce these short multimedia products cheaply, easily, and effectively by “piggy-backing” on the general ubiquity of smartphone-ownership in academia. To use the Studio-in-a-Box, teaching teams would “check-out” a kit at the beginning of the semester, much like you would a book at a library. Over the course of the semester, as learning obstacles arose, the teaching fellows would utilize

the workflow (described below) and the physical arm to craft short explainer videos for student scaffolding. The physical arm itself is easily stored and set-up, so it can be utilized at a moment's notice. Additionally, by piggy-backing off of the prior-knowledge users have of smartphone camera-use, the learning curve for production is much smaller than in a larger film studio.

Unlike the format of the following two use-cases, the teaching fellow use of the studio in a box has an "encouraged" filming format. While the physical arm can be articulated in almost any imaginable way, and there are a variety of reasons in which a variety of filming perspectives or formats would be stronger in some cases, through design and research I have created a default position in which I believe it is pedagogically strongest. By pointing the camera downwards while holding it above a table, this forces the media producer to articulate their concepts over both auditory and visual channels. We know from a variety of strands of research that this is a strong pedagogical method both for the eventual audience and for the learning of the presenter (Leahy & Sweller, 2011; Low & Sweller, 15; Sweller, van Merriënboer, & Paas, 2019; Yaghoub Mousavi, Low, & Sweller, 1995) by "spreading" the information across multiple modality-paths: visual and auditory.

Finally, integral to my interests is to create a product that can scale to schools, communities, and countries that across different socio-economic statuses. Utilizing a media-production pathway that is already democratized to the target population allows for deep penetration and spread across a variety of economic backgrounds and removes the economic entrance-obstacle to schools using media for education. At an estimated \$50.00 a piece, the

Studio-in-a-Box represents a gateway to on-demand educational media scaffolding production across income quintiles and communities of varying resources.

3. Faculty Rehearsal



One possible use of the Studio-in-a-Box arose when the faculty director of CHDS asked whether there was a low-stakes way she could record a rehearsal before ever coming into the studio. Immediately upon presentation of the physical arm from the Studio-in-a-Box, our filming preparation time went down significantly (project workloads vary, so it is difficult to put an exact number to time-saved per-project, but it is likely days). Additionally, and perhaps more significantly, the faculty director had

far greater self-assessed confidence coming into the studio to film.

While the logistical benefit of saving time is a boon from any perspective, it pales in comparison to the value that is brought by an increased confidence and comfort in the faculty. Through experimentation at my own studio at the Center for Health Decision Sciences at Harvard School of Public Health, I've found that the performer's environment and emotional state have far reaching consequences to the quality of the product. Camera's and microphones pick up the tiniest of falsehoods and emotions. If the teacher is upset or tired or unsure of the material when we are filming, it is likely this will read to the students in the final product. If they are confident and enjoying themselves, the media product will likely be pedagogically stronger. Indeed, in breaking this scenario down into basic cognitive load theory, one could suggest that any emotional signaling to the audience could be considered extraneous load on

the learner, and taking space away from germane load within their working memory capacity (Mayer & Mayer, 2014).

Following these insights, I lent out two Studio-in-a-Box's to two faculty, Dr. Eve Wittenberg and Dr. Sue Goldie, both of whom were already familiar with the workflow outlined below, and had upcoming filming sessions with me. While data collection is ongoing, this use-case seems a promising avenue, especially to newer faculty who may not have as much experience using production film studios.



4. Production Supplementation

While not an original goal of the project, an opportunity arose while working on a separate project with a faculty member of the Center for Health Decision Science, Dr. Stephane Verguet, a small mistake in the filming process arose after Dr. Verguet had left the country to deliver a workshop in Ethiopia. With no other options, the Studio-in-a-Box was deployed as an auxiliary filming apparatus, and we were able to refilm a small portion of the video using only the Studio-in-a-Box, completely circumventing the need to re-book the film studio. Thus far, from content experts to media professionals, nobody has noticed the change in the video when it switches from a \$5,000USD camera to an iPhone on a \$50 Studio-in-a-Box (Item 1).



Following this success, two other Studio-in-a-Box prototypes were deployed to other faculty who are currently using them as small production tools, similar to the role described

in the teaching fellow production setting described above. Further data on this front is expected to be gathered and analyzed by the end of next semester when faculty have had an entire academic year to experiment with the concepts and prototypes.

5. Constructionist Activities

The Studio in a Box is a powerful tool for affording students the chance to create something as an option for an in-class or homework assignment. Students set up the Studio-in-

a-Box's arm and attach their own smartphone to the holder. Through the workflow described below, students can scaffold their production efforts- the workflow can be adapted and customized to different settings by eliminating or including various steps. This elimination protocol enables teachers and students to customize the workflow to the environment, learner context, and activity priorities.

While in the teaching fellow edition of the Studio-in-a-Box, the filming process is generally set up in the default position, which is with the camera-phone facing down towards the table it is set up on, this is not as emphasized for student use. While the learning benefits are very much present, and arguably more applicable in this setting than in any other, this may not always serve the student best. Classroom and homework assignments have the fickle ability to arise in any form: from the team makeup, to the content, to the time allotted for the activity. The Studio-in-a-Box is a modular studio (and workflow) that can and should be adapted to your specific scenario and preferences. Giving students freedom to experiment and tinker has proven to be a pedagogically strong strategy (Honey & Kanter, 2013; Ryan & Deci, 2000; Wilkinson & Petrich, 2013). While there are tangible pedagogical benefits to the cognitivist approach of forcing articulation over multiple channels as framed above, if these attributes stand in the way of an assignment, they instead confer extraneous load as opposed to facilitation and removal of cognitive load. For example: if a student only has to explain a simple concept, the default position of aiming straight down may work- they may speak while they draw, or use manipulatables. Meanwhile, if the assignment is to do a form of interview, this filming format may be more constraining than it is helpful. Thus, the Studio-in-a-Box is designed for use at any angle or position, enabling teachers and learners to decide for themselves how

best to use the product- an experience that will likely lead to further learning for the class, and further development of the Studio-in-a-Box itself.



Figure 6 - College students using the Studio in a Box for constructionist activities in the classroom.

6. Workflow

The workflow of Studio in a Box follows a 6-step process:

- 2x2

- Identify the main four points in a 2x2 (read TL->TR->BL->BR) and narrow the focus of the video. A sample 2x2 box is below with sample steps in the production.

Point 1 (Introduction)	Point 2 (Big Idea/Main Point)
Point 3 (2 nd Main Point/ So what?)	Point 4 (Conclusion)

- Staircase Breakdown

- A proprietary method of initiating the development of media-curriculum planning. This is comparable to an “outline of a storyboard”. The staircase method is used to break down and chunk the material, as well as identify possible supports. In the photo below, you can see a staircase in use as a simple lesson about implicit bias. The top of the staircase (where one would step) describes the learning goal or theme of the section, and the bottom of the staircase (i.e., where the supports would prop up the staircase) describes the

different ways one would go about explaining this (i.e., Manipulatable on a map? Drawing? Etc.)

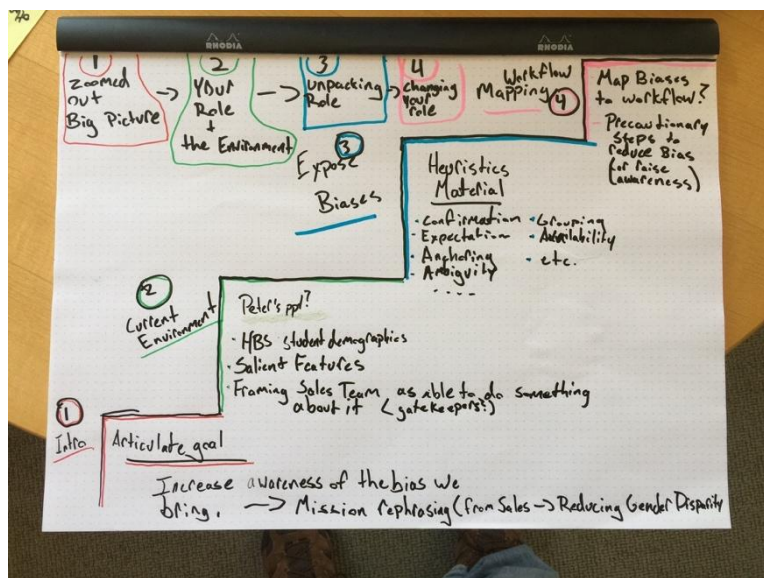


Figure 7 - An example of a staircase breakdown of a short curriculum

NOTE: I also put time into developing this further, and included below is an example of the staircase method being used to describe a portion currently present course at the Chan School of Public Health. I thought you might find it interesting. The different levels represent different levels of the course (i.e., Top level = Module 1-14; Middle Level = Breakout of Module 1; Bottom Level = Individual video of Module 1). I created this for example purposes so that one could see that it could be applied at different levels beside Studio in a Box.

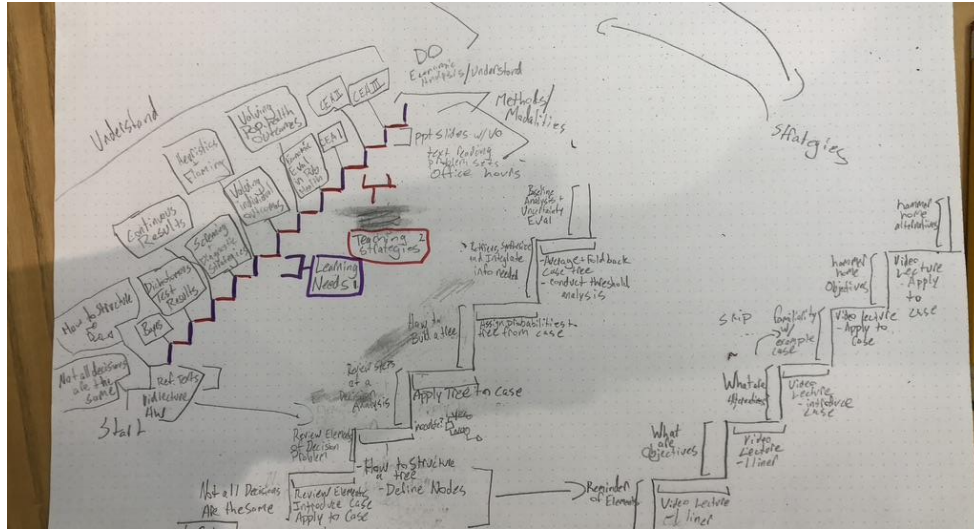


Figure 8 - A more complex curriculum mapping through the staircase method. While this curriculum design is likely too complex for the staircase method alone, it displays its utility at all levels.

- Storyboard
 - A more traditional Storyboard that creates an audio/visual script that can be used not only for planning, but as a reference script while filming takes place.

- Filming (Trial and Error One-Takes)

- Filming takes place on students iPhones and students attempt to record their media (can be any type of video: explainer, teacher video, narrative, documentary, photograph, downloaded photo, etc. – choice is intended).



- Edit
 - Student's take iPhone (which they recorded on) and can take that file home and retain ownership (which is also a help when students feel unsure of the quality

of their work) and lightly edit. The most intense edits are intended to only be trimming the front and end. All of this takes place on the iPhone and through the phone's default apps (i.e., Apple Photos/Camera).

- Share
 - Student's share their media with the teacher/class. This is decided by the teacher and should appropriately fit the activity.

7. Prototype Development

This process has also led me to iterate on the physical prototype. Initially, I cannibalized a C-stand from my film studio at the School of Public Health and used a Super-Mafer clamp to

attach it to the desk- this, I lovingly referred to as my “Frankenstein prototype”, as it was something of a thrown together, not very pretty thing, but it worked!

I intended to iterate on this prototype further, which led me to 3D printing a new model



(photos below). One idea I had for scalability was to create a prototype that could be created elsewhere (I have no desire to maintain an inventory, and this would enable others to create it themselves). Understandably, 3D printers aren’t available at all schools, but after some advice, I wanted to consider multiple ways of creating it, and 3D printing seemed like a good avenue to begin, as it was fast and highly available to me.

This attempt at printing didn’t work, mostly due to the screw-threading not being fine enough, but did provide me a learning experience. I have started investigating 3D modeling software to develop my next prototype.

Another idea that I am investigating is modifying a selfie-stick to work with desks.

These will be investigated and iterated upon over the course of the next year.

8. Media Literacy

As a final note, across all applications of the Studio-in-a-Box, media literacy instilment is an overarching goal of the endeavor. In the current political atmosphere across the globe, with the

new environment of digital propaganda and misinformation machines, and the polarization of journalistic institutions, media literacy has become a key competence of the 21st century. With the amount of misinformation available, and the tendency of digital mediums to cater to our already-held views, having a literacy of how media is created, and the basic cognitive pathways it can take advantage of is integral to preserving modern democracy and human rights. When people are exposed to misinformation at the scale of recent years without a built-up resiliency to either the content or the messaging method, they can begin to make decisions that aren't in their interest. We can see examples of this in health in the anti-vaccine movement (Hoffman, 2019), in politics with events such as PizzaGate (Aisch, Huang, & Kang, 2016), and in economic decisions, such as who to choose to invest your money in.

Participating in media production is a highly effective way to generate literacy for the production of media. By using the Studio-in-a-Box as a media production conduit, learners and teachers will have the ability to cheaply and frequently build new media. This exposes the users to the “creases and folds” used to craft a message. Understanding that you can manipulate video by removing 1/24th of a second here, or cropping out a person there, leads to a greater fluency in understanding the intentions of the producers upon personal consumption of that media. In all applications of the Studio-in-a-Box, the users are getting this exposure, and therefore building resilience towards media-based propaganda.

9. Further Pilots

In addition to the informal pilots with faculty rehearsal, production supplementation, and TF usage mentioned above, I have conducted three data-driven pilot studies with the Studio in a

Box prototype. One with the Learning Lab at the Global Health Education and Learning Incubator (mostly TFs, some graduate students), and two with Dr. Eve Wittenberg's freshman writing class at Harvard college. In the GHELI Learning Lab pilot, it was purely observational and gave me the chance to see how the workflow would be used, and if the physical arm was conducive or an obstacle to learning.

It turned out to work quite well, we tried the SiaB in a variety of physical formats, as well as with and without different parts of the workflow. These weren't strictly controlled and were more an attempt at familiarizing myself with research methods (guided by Dr. Wittenberg, as well as others at HGSE) than truly assessing the design. That being said, some very interesting tidbits arose from these pilots:

1. No significant learning gain between Studio in a Box and "Selfie" mode.
 - a. Using a post-survey, we found that there was no significant difference in self-perceived gains in learning (we asked about the confidence they had in the essence of their essay compared to before) between when students hold their smartphones, and when they use the Studio in a Box to film themselves. This is important information that points towards the Studio in a Box having an optimal scenario.
 - i. This must be re-done, partly because we weren't able to give a pre-survey, and the wording of the question wasn't perfect. I also used a 3-point scale based on words (i.e., not at all, somewhat, a lot; and next

time I will use a 5-point Likert scale to avoid confusion over what levels mean, etc.)

2. Workflow/Freedom Tension

- a. There is a tension between the default workflow steps and filming position, and the freedom the user has to disregard all of that and do their own thing. What I found during these studies, however, is that this isn't so much of a tension, but a reflection of "different methods working in different scenarios". The workflow tends to work much better when we value the end product (i.e., a good two-minute explainer video), whereas if the *process* is valued over the product, the user is better off eliminating the most structured parts of the workflow. (i.e., a class activity where the articulation is the most valuable learning experience, but you don't care what the output looks like)
 - i. This makes sense, as I developed the workflow from production methods I've used in the film industry, which obviously values its products over its process.
 - ii. I think this is actually good, as opposed to pointing towards needing further iteration, it points towards the workflow being flexible by being "sub-out-able"
 - iii. Further testing on this front will take place in Spring 2020 with Eve Wittenberg's second semester writing class, RDS 202 at HSPH, and SW24 at the college.

3. Discussion Focus

- a. In our second pilot with the writing group, we used a person-view (i.e., the camera is pointing at the person's face), and did a split study of groups using the Studio in a Box and those just holding their phones. While there wasn't much difference in the outcome (they had practice developing the "elevator pitch" of their final essay for the class), I observed greater interest and value in the conversations of those who used the Studio in a Box than those who didn't.
 - i. While this is a tiny sample size, weak research methods, and we aren't positive the group performance variance isn't due to social dynamics (i.e., all friends in one group, all strangers in another, etc.), I hypothesize that this is because the Studio in a Box requires others to run it (i.e., while the talent is talking, others have to time, or hit record). This creates a center of focus on what is happening. The groups who were holding their smartphones for filming tended to have the "talent" filming and talking, while the other two people in the group completely checked out.

4. Vulnerability

- a. In our pilots with the College Writing class, there arose some interesting observations. Firstly, the fact that they were able to retain ownership over the video file gave them security. This increased how vulnerable students were able to be in class, and seemed to engender further excitement about the activity, and other positive affective responses. This was explicitly written by two out of the 13 students on their surveys.

10. Next steps

I will be conducting pilots in at least three classes next semester:

Dr. Eve Wittenberg's writing class at Harvard College (We will be conducting the

Same tests, but with the lessons I've learned from this semester). I'll be reworking the test, refining my surveys (and their timing), and working out logistics to smooth the operation.

Dr. Sue Goldie's RDS 202 is an online decision science course at HSPH (which I originally instructionally designed) that I will be piloting the Studio in a box use as a TF aid. This is an online asynchronous course which often requires the TF to supplement the course work with explainer posts on discussion boards, or in section. The Studio in a Box pilot will explore its use as a TF support to create explainer media for such instances.

Dr. Sue Goldie's SW24 at Harvard College will be another pilot venue. While I've gotten clearance to pilot it with the TFs in this course (for similar reasons as RDS 202), however, I'm working on getting permission to run a pilot inside the classroom (there are generally at least a hundred kids in this class).

11. Conclusion

The Studio-in-a-Box project holds promise as a tool for scaling media access across all levels of education. From creating a media-production based avenue for constructionist activities in the classroom, to enabling TFs to turn their phones into educational video production studios, the

potential value of studio-in-a-box is enormous. Through the iteration and testing process, I hope to develop a variety of prototypes, specialized for specific settings, able to be built by the end-user. While one model may be specialized for classroom setting and to be built for as low-cost as possible, another model could specialize for faculty rehearsal at large universities, prioritizing quality and ease of recording to lower the labor cost of filming course material. Through iterative prototype development and rigorous assessment in settings representative of the intended use-case, I'll continue to develop the Studio-in-a-Box over the coming year.

12. Appendix

Figure 1 - TF Pilot Team at the Global Health Education and Learning Lab in October



Figure 2 - The Learning Lab team at GHeli experiments with using the Studio in a Box as a teaching fellow

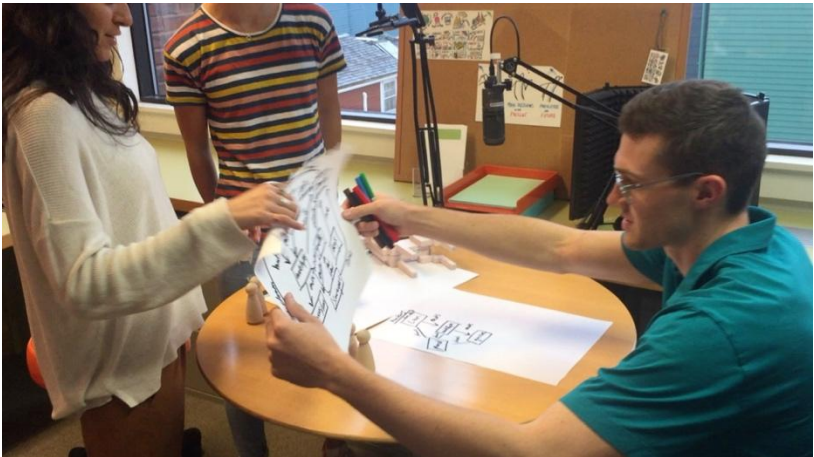


Figure 3 -
Introducing
the Studio-
in-a-Box
prototype to
the faculty
director for
the rehearsal
pilot



Figure 4 –
Further
experimentat
ion with the
faculty
director

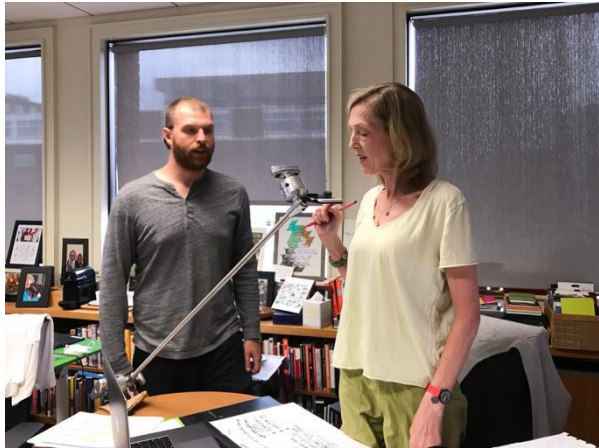


Figure 5 – Using the Studio-in-a-Box to supplement the production of a film-studio-produced video.



Figure 6 – College students using the Studio in a Box for constructionist activities in the classroom.



Figure 9 - Harvard college students using the Studio in a Box in a writing class at the college.



Figure 10 - 3D Printing a new prototype



Table 1

Name	Role/Location	Interview Topic
Faculty		
Dr. Eve Wittenberg	Senior Research Scientist – Center for Health Decision Science - HSPH	TF Use; Classroom Use
Dr. Karen Brennan	Associate Professor of Education – HGSE	Classroom Use
Dr. Sue Goldie	Director of CHDS; GHELI; Roger Irving Lee Professor of Public Health	TF Use; Faculty Rehearsal
Lisa Robinson	Senior Research Scientist – Center for Health Decision Science – HSPH	Faculty Rehearsal
Dr. Stephane Verguet	Assistant Professor of Global Health	Production Supplementation
TFs		
Nina Bhattacharya	TF – T550 (HGSE); SW24 (College)	TF Use; Classroom Use
GHELI Learning Lab Team	SW24 (College)	TF Use; Classroom Use

Item 1: <https://vimeo.com/356935631>

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