

Melissa Boviero
Practicum in STEM Leadership

Increasing Makerspace Participation Among Middle School Faculty

School Information:

I teach and dean the sixth grade at Hackley School. Hackley is a K-12 private school located in Tarrytown, NY. We have a population of about 800 students across the three divisions, with approximately 250 students in the middle school. Our middle school division is fifth through eighth grade.

Project Summary and Purpose:

Last year, our school selected several teachers across grade levels (K-12) and disciplines to develop a design and share how we would use a MakerSpace on campus. I was fortunate to be on this committee. Our school was generously granted a budget to redesign a classroom at our school to function as a MakerSpace. Our group decided to design the MakerSpace in the Middle School building because of the available space and because it was physically in the center of our campus. We wanted all divisions to have access to the space.

The space was opened in January 2018, and through our committee's feedback, it includes a plethora of useful materials: materials for circuitry, 3-D printing, textiles, wood working, general tools, craft materials, and the flexibility to arrange the room to accommodate student motion and collaboration. It is a remarkable and dynamic space, with bright writable walls and cabinets of new materials waiting to be used. It is a physically inviting (and inspiring) space. However, over a month after its opening, as I pass this room daily, I wonder why do I see it perpetually empty and unused?

When we opened our MakerSpace, we had a large Maker open house, and the space was packed with students. We ran the open house for several days. Teachers on the committee who had already been using Making concepts in their classrooms showcased projects their students had made. Also, students who are involved with Making outside of school were also invited to bring things that they have made at home. We had close to twenty items to showcase and a steady stream of students came to the open house. At the open house, students could also use many of the available materials to tinker and make an item for themselves. The student interest to use the space is very much there. However, since we do not have a full time instructor in the

MakerSpace, it is up to each individual teacher to take their classes to the MakerSpace if they wish to use it. We set up a sign up system, similar to how someone would reserve a computer lab, to allow all teachers to access the MakerSpace by period. I have a robotics club that meets twice a week, so I am consistently on the signup sheet to reserve the Makerspace for our club time. I have yet to hit any conflict because the space is severely underutilized. In asking around among the faculty, many teachers remarked that they were unsure how they could use the space, or that they felt intimidated about using the space and available materials. **Through my STEM PD, I would like to help the middle school faculty utilize the space more and brainstorm ways that they could use the space relevant to their curriculum.**

Audience:

My proposed audience is the middle school faculty, and specifically the sixth grade team. As the sixth grade dean, I have a meeting with the sixth grade faculty approximately once per week. The sixth grade team consists of our division head, or assistant division head, or school psychologist, our sixth grade advisors, and any teachers that teach a sixth grade section in any academic and non-academic area (music, band, PE, etc.) Although the sixth grade team is twenty-five teachers, approximately 12-15 attend the sixth grade team meetings. This includes teachers across a variety of disciplines including: math, PE, English, Chinese, Spanish, computers, Latin, the learning specialist, the school psychologist, and the division and assistant division head. Each teacher would average a student load of approximately 65 students.

Standards and NASA Assets:

The use of MakerSpace and Making hits across various NGSS Frameworks in Science and Engineering Practices, including: Asking questions and defining problems, analyzing and interpreting data, constructing explanations and designing solutions, and engaging in argument from evidence. Furthermore, NASA Education has great resources for Engineering Design activities that could be created in a MakerSpace through their NASA BEST (Beginning Engineering, Science, and Technology) website. While the activities themselves are oriented towards STEM, engineering design could be used by a variety of content areas. For instance, in speaking with the History teacher, we spoke about how he could use the space with his students to have his students create replicas of architecture during feudal Japan in that respective unit. While making wouldn't replace activities that teachers are currently doing in their classroom, it could provide an opportunity to learn content differently and in an enriched way. While the History teacher seemed interested in the possibility, he was hesitant to use the space because he

was unfamiliar with MakerSpaces. In speaking with him and other teachers, I have realized that there is a perception that MakerSpaces are relevant to science classes, only.

Description and Outline of Activities:

To help demystify and familiarize MakerSpaces to teachers who don't realize the potential that exists for their own curriculum in the space, I would like to use a team meeting time (which is one hour per week) to hold my team meeting in the MakerSpace itself. For the PD, I would have teachers:

- 1) Meet in the space and take 15 minutes to freely view and handle all the items in the space. This may help teachers see that there are a variety of tools, craft materials, textiles, computers, wires, etc. that they may not have associated with making.
- 2) Instruct the teachers to think of how they could use the space in one unit of their content area to build or make an item that would enrich their curriculum. This brainstorming would take approximately 35 minutes. They would develop tentative plans and look around the room to see what materials they could use.
- 3) Then, I would have the teachers share out for the final 10 minutes. *There is also the possibility of having teachers return to the space for a future PD but paired up across disciplines to create a cross-curricular activity.

Outcomes:

Through this PD, the desired outcome would be that

- a) Teachers that are unfamiliar with MakerSpaces and Making would see the value and potential for Making in their lessons.
- b) Once seeing the ability of Making in their own curriculum, they will start to use the MakerSpace during their class times. This, in turn, would allow the students to use the MakerSpace with greater frequency, too, since they currently can only use it through a class.

Follow-up:

To follow up, I would create a survey to determine their initial thoughts regarding their usage of the Makerspace before the PD, and then follow up with a survey approximately three weeks

later to evaluate if sixth grade faculty still had the same feelings regarding their usage of the space, and to also check if they have actually increased their usage after the PD. An increase in teacher participation in the MakerSpace would help me determine if the PD was successful.

Pre and Post PD Surveys:

Inspired by surveys I researched, I would create a Pre and Post PD survey using SurveyMonkey or Google Forms. The questions I would include are included in the hand-out titled “Boviero_Pre-Post_PD_Questions”

Resources:

Engaging Students in the Stem Classroom Through "making"

<https://www.edutopia.org/blog/stem-engagement-maker-movement-annmarie-thomas>

Engineering Design Process

Sandra May –

<https://www.nasa.gov/audience/foreducators/best/edp.html>

Makerspaces

<https://www.surveymonkey.com/r/7CRPP3K>

Ms-ess3 Earth and Human Activity

<https://www.nextgenscience.org/dci-arrangement/ms-ess3-earth-and-human-activity###framework>

Teachers in the Makerspace: An Exploration Experiment

Plemmonsa –

<https://expectmiraculous.com/2015/02/17/teachers-in-the-makerspace-an-exploration-experiment/>