Tales of the Traveling 3D Printers

Caitlan Cole and Greg Robbins
MOBILE MAKERSPACES AT DREW CHARTER SCHOOL

- 4 STEAM Trunks differentiated based on specific strands of making
- Trunks play essential role in fully integrating STEAM into PBL + daily instruction
MAKING IT ALL POSSIBLE: 3D PRINTING TRUNKS

- Mobile 3D printing farms: 4 Printrbot Simple printers on each cart
- 1 cart for PreK-Grade 5; 1 cart for Grades 6-12
INCREASING ACCESS + EXPOSURE

- Ultimate goal: give every Drew student opportunity to experience 3D printing
- Solves issues encountered with keeping printers in single fixed location
- High level of adoption in first year
- October 2016—February 2017: checked out 38 times total
  - 7 different teachers
  - Kindergarten through Grade 8
3D PRINTING TRUNK IN ACTION

- **STEAM PBL Gold Standards**
- **5th grade PBL**: How do innovations change lives?

The "Bye Bye Bunnies" prototype was made by a dust-pan from Dollar Tree, three brushes from Dollar Tree, 2 packs of Chinese clay from Jo-Ann’s, and hot glue and super glue from Walmart. The prototype includes a indent in the handle so the broom can easily snap on. The prototype is made to be hands free; the handle curves in and attaches to the dust-pan so you can put your foot on the handle so you only need to use the broom to sweep. I guess this feature solves back pain too!
3D PRINTING TRUNK IN ACTION (cont.)

8th grade PBL: How can I redesign a contact sport helmet to prevent concussions?
3D PRINTING TRUNK IN ACTION (cont.)

Kindergarten PBL: How can we be different and still be friends?
3D PRINTING TRUNK CONSTRUCTION

- Designed by students, built by a contractor. They were built out of wood with plexiglass holes.
- Made to fit through our doors and elevator. Roughly 4’X5’.
- They are different from other school’s mobile makerspaces, in that they focus specifically on 3D Printing only, and there are four 3D Printers instead of one.
SETTING UP THE TRUNKS

- The 3D printers, materials & labor costs were provided by grant funds.

- Printrbot Simple Metal 3D Printers w/ Heated Bed
  - Budget-friendly.
  - Compared to other brands, are much more easy for the layperson to fix.
  - They are metal and more durable than wooden or heavily plastic counterparts.

- Greg unboxed the Printrbots and set up the trunks.

- Our technology department had old, small PC laptops that had been decommissioned, and they donated them to us. We fitted each 3D printer with a laptop.
  - If possible, it is best to have one computer per 3D printer.
  - Make sure that the computers you use will be compatible with the 3D Printers. Certain operating systems don’t work well with certain 3D printer softwares.
TRUNK MAINTENANCE

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- If I can teach myself how to operate 3D Printers and train others, YOU can too! There is a wealth of information on the internet about how to effectively 3D print.

- 3D Printer brand-specific forums exist to help you with any question you have, as well as Youtube videos, etc.

- Sometimes the printers can be fixed quickly, sometimes it takes hours upon hours to fix. They also semi-frequently break unexpectedly, which is why it is important to have a dedicated person for printer maintenance.

- Should have multiple spares for each expendable part, and come up with an estimate of how many parts are needed based on a log of which parts typically break the most.
PROFESSIONAL DEVELOPMENT

- Depending on rate of learning and amount of teachers in the trainings, the trainings are either one 30-45 minute session, or two 30-45 minute sessions.

- ALL teachers are teachable if they are willing.

- High schoolers can be trained to run and maintain the carts. We are working on this.

- There definitely needs to be either a dedicated person to fix them, or training to each operating teacher on how to troubleshoot online and to fix the printers.
CHALLENGES

- They require constant maintenance.
  - Constantly moving the trunks leaves the printers at risk of needing to be re-calibrated.
  - The printers sometimes seem to have a mind of their own (not just the Printrbots, as we have other brands and models at the school), and frequently malfunction, particularly with heavy use.

- Teachers rarely have enough time to fix the 3D printers themselves.

- We anticipate a future challenge with staffing if we no longer have Maker VISTAs. We believe that the trainings and guide will mitigate this. If there is no dedicated staff, there should be a coalition of trained people (teachers, volunteers, etc) to maintain the 3D printers.

- At some schools storage has been an issue; not at ours.
ASK US YOUR QUESTIONS!

Learn more about Drew’s traveling STEAM Trunks @ steamatdrew.weebly.com

3D Printing User Guide available under “Our Work” → “3D Printing at Drew”