“e-NABLING” Learning: 3D Printing in Kinesiology and School Maker Culture

Heather McTavish, MIST
Library Support Services, Dufferin-Peel Catholic District School Board

Introduction

Cardinal Leger Catholic Secondary School uses 3D printing and open source code to support practical, hands-on learning in Kinesiology. An initiative of the Physical Education Department, students print prosthetic limbs as part of a “3D Mechanical Hand Maker movement,” partnering with Enabling the Future—a global network of volunteers committed to providing a “helping hand.”

Enabling The Future

E-NABLE is a global network of volunteers with 3D printing capabilities, who commit their time and knowledge to help provide 3D printed prosthetics to people around the world in need. The E-NABLE community is diverse, made up of “teachers, students, engineers, medical professionals, technicians, designers, coders, and makers,” who all contribute their unique expertise. The goal of E-NABLE is to provide hands to underserved populations around the world, who may not have access to traditional prosthetic devices. They cost upward of $8,000. Through E-NABLE, volunteers are matched with recipients and along with the help of a strong online community, they are able to print a fully customized prosthetic for that recipient.

The Kinesiology Project To Date

2014/15 school year:

- Students visited the Brampton Public Library to see an introduction to 3D printing by Sheridan College, printing parts for a Robotic Hand prosthesis.
- Further printing was done by Thamesmills, an affordable retail 3D printing company.
- The Learning Commons and school administration saw a need to support this initiative and purchased a MakerBot Replicator 3D printer.
- Faculty and students tested and troubleshooted initial 3D printing at Leger (laser cutting was used for both teachers and students).
- Students printed and assembled a Rochester Institute of Technology 3D prosthetic limb to certain specifications.
- Through Enabling the Future, a customized printed prosthetic was provided to a local child recipient.

Benefits To Learning

- Students see a real-world practical application of their learning.
- Influential student post-secondary education choices.
- The use of technology for this course has been a catalyst to inspire others in the use of technology for their future.
- The learning commons has created a space where this type of learning is supported, welcomed and encouraged.
- A maker club was started (self-directed, project-based learning).

A Growing Maker Culture

The creation of a small MakerSpace and resulting culture at Cardinal Leger Catholic Secondary School is the fortunate consequence of the Learning Commons responding to a need to support ongoing staff and student learning within the realm of physical education and the school’s unique partnership with Enabling the Future. While students enrolled in the Kinesiology class were first to use the MakerSpace, learning and innovation has not stopped there.

This curricular collaboration has since inspired other initiatives and as a result the MakerSpace of Leger and teacher interest in using the 3D printer for innovative assignments is slowly growing to support other departments and students’ use of technology in education.

The Future

“We shape our tools, and thereafter they shape us.” – Jean Cuvillier

With educators and students alike having access to these types of technologies and spaces to explore, there is an increased opportunity for educators to create timely lessons with (real-world) practical applications, in turn enhancing pedagogy and for students to feel engaged and to be innovators.

By adding to the MakerSpace, the Leger Learning Commons hopes to inspire others in the use of educational technology and collaborative projects that take curriculum to the next level, while keeping the school library relevant, exciting and the place to be.

GOAL of 2015/16 School Year:

Taking the project one step further this year, students will print a “Limbomni” arm/electric arm and learn to program the microcontrollers which enables limb mobility through a connection to motors in the arm. The end goal is to provide the child recipient with this bionic option.

- So far students interested in 3D printing have formed a small club (5 people), learning along with their teacher and in preparation for the Kinesiology class this second semester. They are currently testing and troubleshooting printing for the Limbomni Arm.

Printed parts for the Limbomni Arm