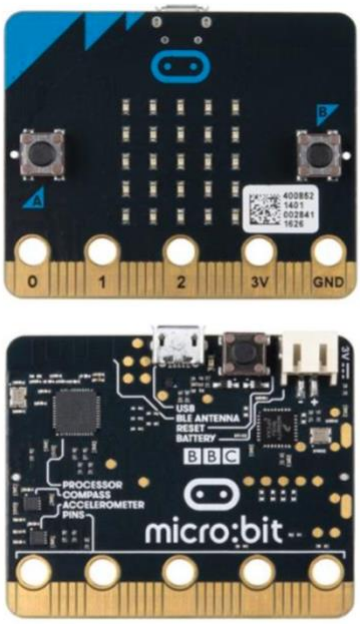
Faculty Innovation Grant 2019-2020

Recipients: Kathryn Lee and Matt Gallon

Overview

This Innovation Grant funded the purchase of materials and software to develop and implement a 6th and 7th grade technology literacy curriculum. With these purchases we were able to develop a curriculum that taught digital skills in several essential programs opening the doors to digital design, online collaboration, programming, and working in the Brimmer Maker Space.



The front and back of a micro:bit computer board

Materials

With this grant, we were able to purchase the following:

- Thirty micro:bit computer boards and Inventor Lab Pack accessory kits
- Thirty mountable micro:bit cases
- Four 11" iPad Pros, five Apple Pencils
- Five iPad cases
- The Procreate app for each iPad

The iPads and their accessories were purchased over the summer and put to use immediately in the 6th and 7th grade curriculum. The micro:bit computer boards and Inventor Lab Pack were purchased later in the year, as a component of the 6th Grade curriculum. Each lab pack contains a micro:bit computer board, a battery pack, breadboards, led lights, speakers, servos, and associated cables.

A Micro:bit Inventor Lab Pack

Implementation

The 6th and 7th Grade Digital Literacy classes were rolled out at the start of the 2019-2020 academic year. In 6th grade, students began work with a module on the suite of programs in Microsoft's Office 365. Students learned how to create an organized folder structure and share documents for online collaboration using MS One Drive. They learned basic spreadsheet skills and graph creation in MS Excel and how to share word processing documents and track changes in MS Word. Finally, they learned about various

email functions in MS Outlook and how to craft an appropriate email. They concluded by sending an email of gratitude to a faculty member who had made a positive impact on their lives.

7th Grade students immediately began a module on the app Procreate, working with the iPads and Apple pencils. Through a series of exercises, students learned the ins and out of the program, and created a unique piece of art. This module established foundational skills in the app that allowed students to explore on their own and create polished and professional level imagery that could be applied to projects and presentations in all their courses. 6th graders also completed this module after their work in Office 365.

6th and 7th graders then explored a module on Adobe Photoshop. Exercises in Photoshop taught them basic photography editing and compositing techniques.

7th graders also completed a module on Adobe Illustrator. The Illustrator module exposed students to vector format design and the necessary essentials for laser and vinyl cutting.

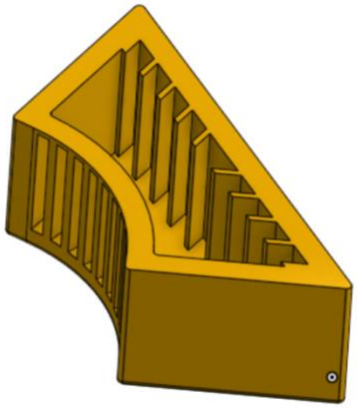
The 6th grade course ended with a module on coding with the micro:bits and MS Makecode. Through a series of tutorials they learned about inputs, outputs, logic statements and basic algorithms. They were given increasingly more complex challenges that they had to solve by writing block code in the MS Makecode interface. This software includes an intuitive interface that allows students to build and test code, and then flip a switch to see their program written in Javascript. The module concluded with a challenge posed to students to write a program to randomly generate an image of rock, paper, or scissors on the micro:bit screen after receiving an input. After writing their programs, students installed the code on the micro:bits and faced off in a class wide rock-paper-scissors tournament using the micro:bits.

The 7th grade course concluded with a module on Onshape, a CAD program, teaching students to design in three dimensions, and laying the foundation for 3D printing capabilities.

Programs Covered

- Office 365
- Procreate for iPad
- Adobe Illustrator
- Adobe Photoshop
- MakeCode
- Onshape

A 6th grader's final project from the Procreate module



A 7th grader's 3D object from the Onshape module

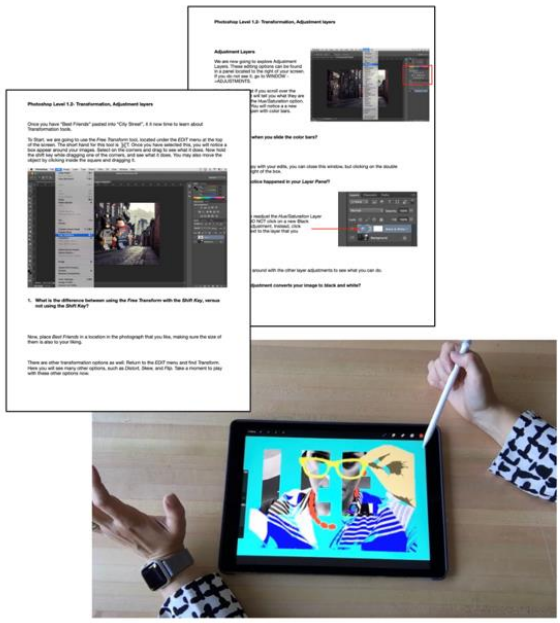
A 7th grader's design from the Adobe Illustrator module

Self-Guided Tutorials with Reflection

- Self-guided exercises
- Leveled
- Cumulative
- Archived in a binder and on Canvas
- Reflection questions

Each module included an introduction to one of the programs above through self-guided tutorials. These lessons included a combination of videos, exercises, and examples to expose students to a variety of skills and techniques. At the end of each lesson, there are a series of questions, asking students to recall what the learned, and also to reflect on how these programs and skills can be used through their course work.

The tutorials and their reflection responses are all collated in an individual binder for students to use as a reference for years to come. As students move into the 8th Grade, and Upper School, they will be able to refence their binder as a textbook for elevating the quality of their projects, experimenting with fabrication techniques in the Maker Space, or exploring more advanced skills in areas such as coding



Students explored each module at their own pace through self-guided tutorials presented as handouts and videos

Impact

Within just a few weeks, the Digital Literacy curriculum had positive impacts on other areas of the Middle School curriculum. Without prompting, students began using Procreate to create polished and professional quality illustrations for projects in Humanities and Science courses. With exposure to Onshape, seventh grade students were also able to utilize the 3D printers and the CNC router for a biomimicry science project, allowing them to build precise prototypes out of wood, rather than scissors and cardboard.

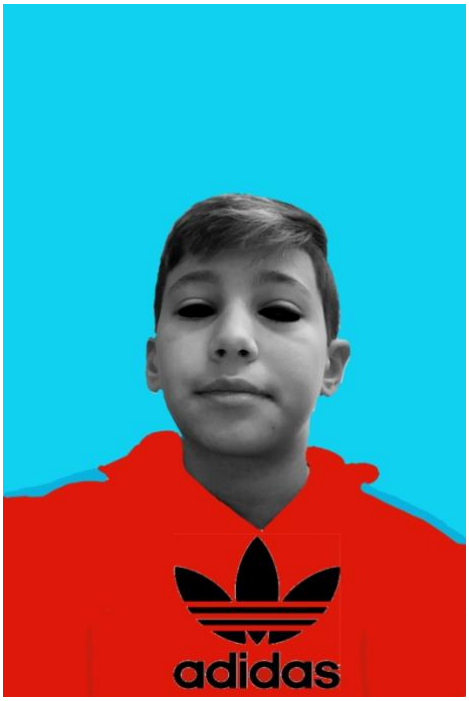
A 6th grader's history assignment submission, which used her newly acquired Procreate skills to create a multi-layered image of the Greek goddess Hera's imagined cell-phone screen.

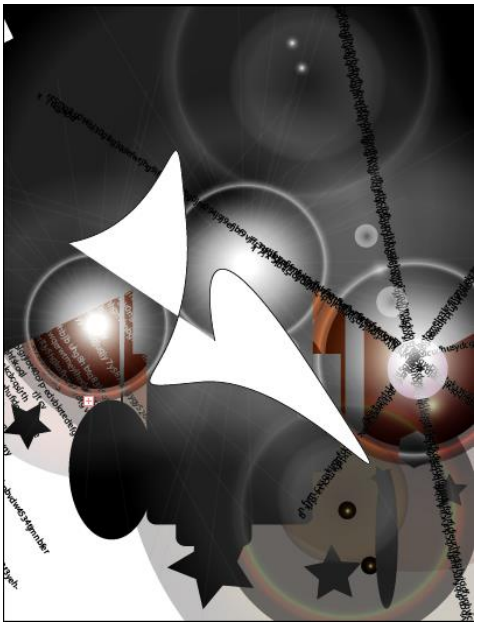
Where Do We Go from Here?

This proposal will have long term effects that carry into the existing 8th and 9th grade curricula, as well as various Upper School electives. Specifically, after their 7th grade year, students will enter the 8th grade Innovation Hour class with fluency in several programs that can be used for programming and digital

design applications in the Maker Space. This knowledge base will enable students to use the Maker Space in more creative and meaningful ways. As a result, students will be able to better utilize class time in 6th and 7th grade core-subject classes. Instead of spending time teaching foundational digital skills, teachers can use technology to support and enhance their curricula. Additionally, with this new digital tool set at their disposal, students will be able to freely innovate in developing new ways of demonstrating their learning in projects and presentations. The example from this year's sixth graders unprompted use of Procreate in history and science is an example of things to come.

Examples of Student Work



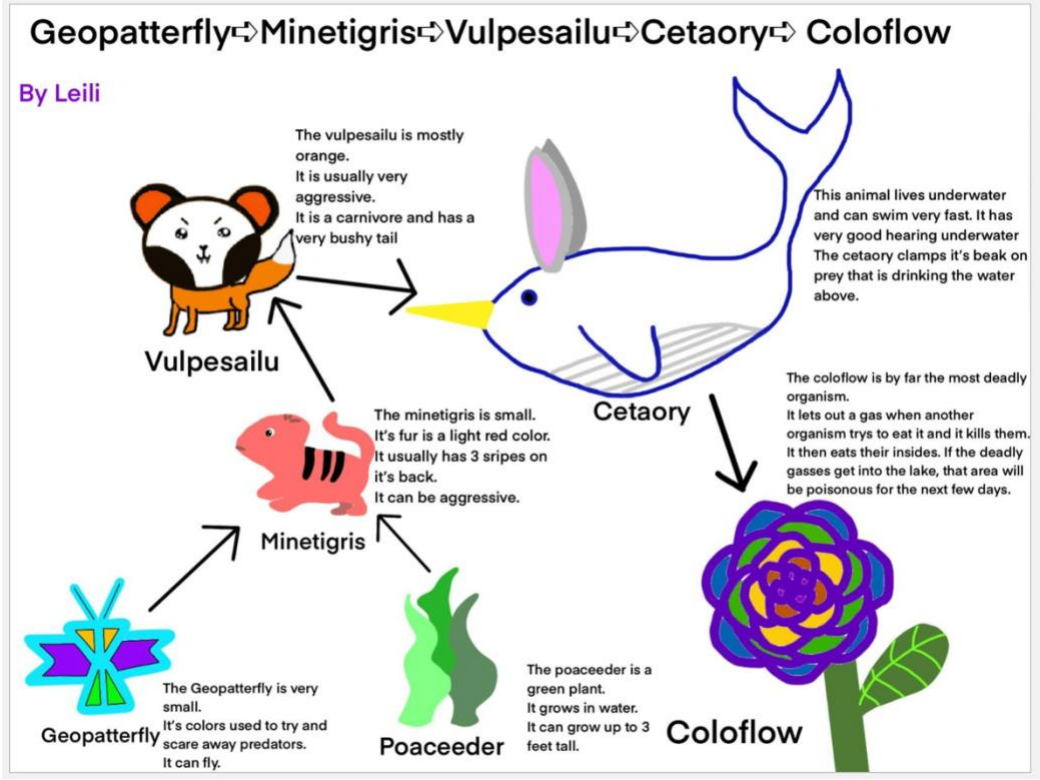


NATURE JOURNAL #1

Eastern Cottontail

Date: Mon April 6
Time: 6:00 pm
Location: Purple Line Tracks
Temperature: 15° C (59° F)
Weather (Are the skies cloudy? Is it windy? Is it raining?, etc.) Partly Cloudy
Observations: hidden behind tall grass, ran before spotted
Date

A 6th grader's nature journal entry for science class in which the student elected to create their drawing in Procreate



A 6th grader's imagined food web diagram for science class in which she elected to create the illustrations with Procreate

Expenses

Item	No.	Unit Cost	Total
Micro:bit mountable case	30	4.95	148.50
SparkFun Inventor's Kit for micro:bit Lab Pack (10 kits per pack)	3	450.00	1350.00
iPad Pros	4	799.00	3196.00
Apple Pencils	5	129.00	645.00
iPad Case	4	20.00	120.00
Apple Care	4	129.00	516.00
Procreate app	4	10.00	40.00
Total			5975.50