BrainCo STEM Kit Use Case Examples

How educators have used the BrainCo STEM Kit

Overview

The BrainCo STEM Kit has been used in multiple STEM education learning environments of different age levels and locations. We hope that your leaning environment will also benefit from the hardware, software, and curriculum that we have organized for your students. In this document, different ways the kit has been utilized will be shared with you.

Please note that specific school, organization, and teacher names have been omitted from this document.

For more information on the BrainCo STEM Kit, available curriculum, open design challenges and more please visit [theavrlab/STEMKit]

Featured Use Cases

One Day Quick Session: Half to Full day STEM session lasting 4-6 hours suitable for small and large student groups in open and closed ended learning environments.

One to Two Week Modules: Multi week sessions that are integrated into existing in school class sessions or routine schedule afterschool learning environments.

Multi Class Crossovers: Multi week sessions that cross between different groups of learners in different subjects.

One Day Quick Session

Suitable for

Afterschool STEM Activity Sessions	Half to Full Day Camp Sessions	Makerspace Project Activities

An afterschool activity provider wished to provide enrichment learning during a summer program. This organization wished to provide exciting, hands on learning experiences that would students to real world STEM concepts. Students were separated into Primary School and High School groups and further separated into groups of 30 students. Each group of students was provided with 4 hours of instructional time and a 30-minute break in between. Each session also had one educator present. A total of 15 kits were available for use in each session.

For the first 20 minutes of the session, the educator used BrainCo provided lesson plans to pose questions to spark design thinking concepts around the uses of technology enabled hands. Empathy for different use areas was cultivated by student led ideas on helping the disabled with prosthetics, gripping items in space, artificial hands on assembly lines and more. Students were then challenged with defining a problem that could be solved by this technology, ideating a solution to this problem, prototyping it with basic movements and concepts and finally conceiving ways of testing it. Students recorded their ideas on paper or other materials they had available at their desks.

For the next 90 to 120 minutes, students were provided with project guided assembly documents and allowed to freely build, reflect, and record their thoughts to these challenges. The educator played a facilitator role, checking that students were working together, asking for students to casually explain their work, and facilitating discussion over any areas where students become stuck.

For the remaining 40-60 minutes, each student group was provided with approximately 5 minutes to explain their prototype to the whole class. Some student groups merged to show different proposals that required the use of two different artificial hands. If the next incoming session did not have new kits to supply to the students, approximately 10-15 minutes were provided to students at the end of the session to disassemble their kits for the next group.

1-3 Week STEM Module

Suitable for

STEM, Engineering, Design, Robotics, Computer Science Classes	Physics, Natural Science, and other Primary or High School Lab Science	Biomedical Innovation, Biotech and Health Science Classes

One BrainCo partner school operates a Primary School STEM Class that completes a series of projects every year over the course of an 18-week semester. Two different classes meet every day, one class being approximately 30 Grade 6 students and the other being approximately 30 Grade 7 students. Each class is approximately 50 minutes long. This educator used different educational sets over the semester, each being used in approximate 2-week periods. This educator wished to use a new educational experience with provided curriculum, hardware, and other options to fit into a two-week session. Ten sets were available for each group of learners, each class organized into groups of 3 students per kit.

Of the five curriculum modules available this educator chose to focus on engineering design and some elements of biotechnology to be integrated into a two-week project. The ultimate set up of class time for each class can be seen in the chart below. Week one focused on creating completed hardware that could then be used in week two as a medium for discussion and prototyping within different subject areas.

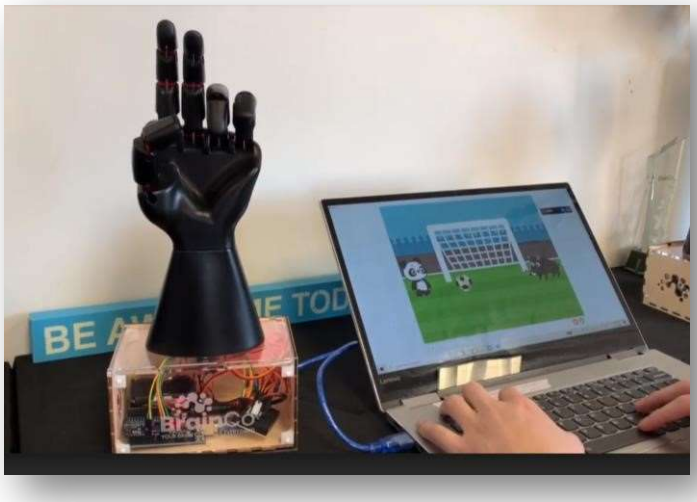
STEM Module Curriculum Plan

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Project Guided Assembly 1: Structures	Project Guided Assembly 2: Electrical Assembly	Project Guided Assembly 3: Tendon Connections	Project Guided Assembly 4: Debugging and Review	Wrap Up and Extra Build Time
Week 2	Biotech and Biomedical Engineering: Prosthetics Technology	Biotech and Biomedical Exploration: Prosthetics and Human Grip	Biomedical Engineering Workshop	Biomedical Engineering Workshop	Biomedical Engineering Project Presentation

In this instance, the educator wished to introduce students to the basics of a unique piece of hardware with electrical and mechanical components through one week of a student guided build. Armed with this hands-on experience, students then completed two knowledge content modules in their second week to learn conceptual Biomedical knowledge about prosthetics with mini 10-minute activities to connect that knowledge to their kits. The last three sessions of week two then focused on combining this content knowledge with their week one practical experience for students to conceptualize their own methods of implementing this technology in a real-world context. Students spent two sessions in a biomedical workshop identifying issues they could solve with this technology and creating mini prototypes with their STEM kits. Finally, these students presented their work to the class in a Biomedical Engineering Project Presentation.

While this educator chose to focus on Biomedical Engineering in the classroom, a 2-3week module within a class could also be focused on engineering design, programming, or other content areas available within the BrainCo STEM Kit curriculum.

Multi-Class Crossovers



Suitable for

STEM, Engineering, Design, Robotics, Computer Science Classes	Physics, Natural Science, and other Primary or High School Lab Science	Biomedical Innovation, Biotech and Health Science Classes

An additional BrainCo partner high school purchased 6 sets of BrainCo STEM kits and wished to utilize them in the 2019 school year within a Garde 9 Biotech elective class and Grade 9 Introduction to Programming class. This school recently created an “Innovation Center” makerspace and wished to utilize more options to bring different class disciplines together into combined projects. Each class had approximately 15 students and lasted for one semester.

The Biotech elective class was comprised of a series of different project-based activities and 2 weeks of daily 50-minute class session time were devoted to the BrainCo STEM Kit curriculum. The Introduction to Programming class additionally featured different modules over the course of a semester and they additionally scheduled 2 weeks of daily 50-minute class sessions that would start the week after the Biotech elective class 2-week session completed.

The Biotech elective class chose lessons from the Project Guided Assembly and Biotech and Biomedical Explorations module. Groups of two to three students each engaged in hands on build activities to construct

their kits and learn the basic functions of a prosthetic. Starting in week two, students additionally brainstormed and prototyped their own versions of a prosthetic based on information they had researched and collected.

Biotech Class 2 Week Curriculum Plan

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Project Guided Assembly 1: Structures	Project Guided Assembly 2: Electrical Assembly	Project Guided Assembly 3: Tendon Connections	Project Guided Assembly 4: Debugging and Review	Wrap Up and Extra Build Time
Week 2	Biotech and Biomedical Engineering: Prosthetics Technology	Biotech and Biomedical Exploration: Prosthetics and Human Grip	Biomedical Engineering Workshop	Biomedical Engineering Workshop	Biomedical Engineering Project Presentation

Following this, the 15 students from the Biotech class held a joint session with the 15 students in the Introduction to Programming class in the school's Innovation Center. During this session, students from the Biotech class presented their projects from the past two weeks. Then, the students in the Introduction to Programming class were challenged with incorporating programming into their lessons. The programming students arranged their time to learn block-based programming through mBlock and then used their new skills and knowledge to program their kits to fulfil the requirements of their classmates.

Introduction to Programming Two Week Curriculum Plan

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Joint Biotech Programming Session	Lesson 0: Setting up a programming environment	Lesson 1: Foundational Coding Concepts	Lesson 2: Conditionals	Lesson 3: Functions and Variables
Week 2	Lesson 4: Open Programming Project	Lesson 4: Open Programming Project (Continued)	Lesson 5: Integrated Hardware Project	Lesson 5: Integrated Hardware Project (Continued)	Presentations, Reflection and Student Sharing

Learn More

For additional information or descriptions, please visit our website or contact office@accuteque.com