BEEHIVE SCIENCE & TECHNOLOGY ACADEMY

Overview

Location: Sandy City, Utah (Sandy City is a city within Salt Lake County located 13 miles south of Salt Lake City)

Beehive Science and Technology Academy, a Sandy, Utah-based, tuition-free, public charter school for grades 6 through 12, has been in existence since 2011. As a charter school, Beehive provides students with opportunities not found in public schools. Charter school students attend these educational institutions by choice rather than by school district boundaries. With approximately 310 students, Beehive is able to consistently offer smaller class sizes, more individualized attention, and fewer problems (like bullying) that are common in larger public schools. In addition, since the school has extensive STEM (an acronym for Science, Technology, Engineering and Mathematics) offerings, Beehive is uniquely positioned to help students as they prepare for a technology-based future. Since the 2013/2014 school year, all Beehive Science and Technology Academy students have had access to iPads for their everyday use. Beehive was one of the first schools in Utah to provide iPads to its students. Students can take the iPads home with them every night to work on school assignments, collaborate and coordinate with fellow students and teachers, and organize schedules. Since the introduction of the iPads, the school's standardized state test scores have experienced a notable increase and graduation rates have markedly improved. As an Apple Distinguished School, Beehive Academy has been utilizing Apple technologies and tools to shift the culture of teaching and learning where innovation and creativity is nurtured. It should be noted that beginning with the 2021/2022 school year, Beehive will add grades kindergarten through 5 to its offerings. In January 2019, the Utah State Charter School board unanimously approved Beehive's application to expand. During a discussion with the Utah State Charter School Board, Beehive Board President Calvin Zulich said, "Beehive already has a strong record of providing STEM to students in grades 6 through 12 in this geographical area, and there is really no other school nearby that is equipped to also teach grades kindergarten through 5."

Distinguished School

Beehive was named Charter School of the Year 2016 by the Utah Association of Public Charter Schools, and given Platinum STEM School Designation (the highest designation possible—and Beehive was one of only two schools to receive this) by the Utah Board of Education and the STEM Action Center for the 2015/2016 school year. Both achievements are remarkable since there are now over 120 public charter schools in Utah.

Beehive has also been the recipient of Best of State awards for the past three years. In May 2017, Beehive was recognized by Best of State in the categories of Educational Institution and Principal (Hanifi Oguz). In April 2018, Beehive won in the Teacher Training category and the student K-12 category (Eldar Muhic). In June 2019, Beehive also won a Best of State award for Support Personnel. Also, in that same month, Beehive was ranked as the number one high school in the Salt Lake metro area by U.S. News and World Report.

In August 2019, Beehive and school principal, Hanifi Oguz, were recognized by Utah Business magazine with a first-ever Living Color Gala award. According to the magazine, the awards recognize "those who have made it their mission to attract and foster diversity initiatives here in the state of Utah." Also in August 2018 and 2019, Beehive was ranked by Niche as the third best public high school in Utah for 2020. In 2015, Beehive was included in Newsweek America's Top High Schools list. In Newsweek America's category of "Beating the odds—top schools for low-income students," Beehive was listed as number 57 in the entire United States. (In 2014, it was recognized as number 231.) Beehive is a Title I school. (For an entire school to qualify for Title I funds, at least 40 percent of students must enroll in the free and reduced lunch program.)

In 2016, Beehive was recognized as the number one best public school in Utah, and the number 24 best charter school in the United States by Niche. According to Niche's website, "Niche is a website that helps you discover the schools and neighborhoods that are right for you. We rigorously analyze dozens of public data sets and millions of reviews to produce comprehensive rankings, report cards, and profiles for every K-12 school, college, and neighborhood in the U.S.

Vision

Vision

Beehive Science and Technology Academy is ensuring that its students are prepared for college and careers in a technologically advanced world.

Beehive Science and Technology Academy is a STEM school that is uniquely positioned to impact students and the community at large. In fact, Beehive's mission statement reads, "At Beehive, students of diverse cultures achieve academic excellence and personal skills in a challenging and innovative STEM environment to become contributing global citizens."

As a result of recognizing changes in teaching tools and methodologies, Beehive Science and Technology Academy established a Digital Teaching and Learning Committee with participation from all key stakeholders to assess its current status and identify future needs. This Digital Teaching and Learning Committee is responsible for recommending improvements to ensure its students are college and career ready in a technologically advanced world. It was this committee that mandated the use of Apple products even before iPads were issued to Beehive students.

Hanifi Oguz currently serves as executive director/principal of the Sandy-based public, tuition-free charter school for grades 6 through 12. Mr. Oguz has international education and experience in the education field. He earned a B.Sc. degree in teaching mathematics in 1999 from Bogazici University in Istanbul, Turkey and an M.Ed. degree in educational leadership in 2016 from Concordia University in Portland, Oregon. Since 2003, he has held several leadership positions with educational institutions in India, Nepal, Sri Lanka, Reno, Nev. and Las Vegas, Nev. He was appointed executive director/principal of Sandy-based Beehive Science and Technology Academy charter school in 2011.

When Mr. Oguz joined Beehive Science and Technology Academy, the school was struggling in terms of enrollment, finances (which are, in many ways, tied to enrollment since much state and federal

Utah STEM Expo 2017 Overview

funding for charter schools is based on the size of a school's student body) and academic performance. Charter school students attend these educational institutions by choice rather than by school district boundaries.

Under Mr. Oguz's leadership, school enrollment has grown from 240 in 2012 to 327 in the 2019/2020 school year. In 2012, the school's graduation rate was 30 percent, and in 2018, that number was 100 percent (compared with the state average of 87 percent).

Role of key stakeholders

Beehive Science and Technology Academy's community members recognize that 21st century technological skills are critical to its students. In fact, in a Dec. 10, 2018 Utah Business magazine online article, the publication noted that today, there are nearly 5,000 open computing jobs in Utah—jobs with an average of over $81,000, nearly double the state's average salary. But, there are not enough qualified workers in Utah to fill many of these positions.

Beehive Science and Technology Academy developed partnerships with colleges, agencies, institutions and corporate businesses to expand these opportunities for its community members by providing, real-world experiences, industry-based projects, related research, internships and job opportunities. So far, more than 25 partners are on board including the University of Utah, Salt Lake Community College, Utah STEM Action Center, IM Flash and Zions Bank, among others.

An announcement video by students using iMovie

Beehive Science and Technology and its principal, Hanifi Oguz, have played a huge role in bringing STEM awareness to the public at large. Mr. Oguz essentially created the Utah STEM Expo, a special event in which students from Utah middle schools, high schools and colleges/universities showcase their STEM projects. The special event just celebrated its sixth anniversary in January 2019 at the Mountain America Expo Center in Sandy, Utah. The half-day event is free and open to the public, and is hosted and organized by Beehive. Approximately 350 students from 15 Utah schools participated in the most recent Utah STEM Expo, and over 4,500 people attended the event.

Mr. Oguz said, "The expo provides a venue for students from across the state to showcase their STEM projects. What's more, it allows companies and institutions with the opportunity to show how STEM is

used to improve our communities. Finally, those who attend can participate in hands-on experiments. In addition to LEGO robotics, robotics presentations, science shows, science trivia and activities, there are chances to win donated prizes. The goal of the expo is to connect our schools to the community, students to professionals, and generate interest and excitement for STEM in general."

In addition to organizing the event, Mr. Oguz secured sponsorships for the STEM Expo (and, in the process, increased public awareness for Beehive and STEM). Sponsors included STEM Utah, Weber State University, Sandy City, Sandy Area Chamber of Commerce, University of Utah, Utah Association of Public Charter Schools, Utah Chapter of the Computer Science Teachers Association, US Synthetic Engineering, Westminster College, Neumont University, IM Flash Technologies, ALS, Utah National Guard, Setpoint, U.S. Navy, OrangePeel, Myriad, TDW, Hill Air Force Base, Myriad and the Leonardo.

Goals and sustainability plans

Beehive Science and Technology Academy secured local, state and national grants and funds and private loans to ensure that its campus has the necessary equipment, infrastructure and tools that will transform the teaching and learning process. The Digital and Learning Committee recommended that the school should utilize Apple products and related educational resources whenever possible. The committee concluded that Apple products were and are the finest tools possible for advancing our students.

The committee knew that just providing infrastructure and tools would not be sufficient to transform learning at the school. Without necessary processes, training and school-wide culture, the Apple products would merely become another resource or simply toys that distract from the educational process. Our team designed professional learning opportunities for all of our teaching faculty, students, parents and other stakeholders to ensure successful implementation of our technologically aided teaching and learning model. All staff members received about 20 full days of training. This training included valuable information about how to teach and learn with iPads and apps from the last six years. Now, we hold weekly professional learning communities where we collaborate and learn from each other. Teachers and staff members share their best practices and generate new ideas of how to implement Apple technologies in their classrooms. An important

A student's STEM project video made by using iMovie

element of these professional learning communities involves teachers using iMovie to videotape themselves in the classroom. Teachers use a portal to share these iMovie videos with peers. Once a week, the teachers' in-class performances are reviewed and critiqued to advance improved teaching practices and techniques.

Beehive Science and Technology Academy has a five-year STEM Sustainability Plan and Digital Teaching and Learning Plan. These plans lay out the goals and action plans to maintain, improve and fund the school's digital learning culture. Included in these plans are ongoing efforts to secure Utah Digital and Teaching Grants and Utah School Land Trust grants to acquire new Apple products on an ongoing basis and provide professional learning to effectively utilize these technologies in their instruction.

Beehive Science and Technology Academy's Digital Teaching and Learning Committee works, supervises, develops plans and curriculum, and makes recommendations to the school board and administration to improve the educational experiences of the students.

Its members are:

Calvin Zulich, School Board Chair

Hanifi Oguz, Director/Principal

Halis Kablan, Curriculum and Assessment Director

Richard Perrine, IT Director/ Computer Teacher

William Harlow, Social Science Teacher

In addition to working with teachers and stakeholders to improve and spread the best practices among staff members and students, this team conducted a study to identify where the school stood in terms of its technology infrastructure and digital teaching and learning culture in 2018. This study was intended to find the school's strengths and identify the areas of improvement. Based on the findings, the team developed a Digital Teaching and Learning plan for the school, and then submitted a request for grants to the Utah State Board of Education to secure funds to implement the improvement plan.

Beehive Science and Technology Academy also submitted a five-year sustainability plan to the Utah STEM Action Center and Utah State Board of Education to obtain Utah STEM Designation. This plan articulated how the school's digital teaching and learning goals can dramatically improve students' lives.

Both plans described above are in alignment. They both lay out the infrastructure needs, teaching and learning needs and strategies, professional learning needs and funds necessary for implementation. The Beehive Science and Technology Academy team that represents stakeholders tries to ensure that the school utilizes the digital tools and Apple technologies that are available to improve student learning. This team has also identified specific faculty training needs and will be providing the necessary resources to meet these needs.

Learning

Learning

Apple technology is impacting Beehive Science and Technology Academy students in a variety of class disciplines, including non-technical areas like Special Education and English courses.

When we use the iPad to learn music, we can have better understanding of it. We can listen to different notes, tunes, beats, and rhythms. It is really fascinating!

(Judge, 6th Grade)

Student Learning

At Beehive Science and Technology Academy, students have a culture of using technology for learning. Technology is a tool for students to research new concepts, deepen their understanding, and communicate with teachers and peers and collaborate on projects to increase their creativity and problem-solving skills. They use technology to keep track of their assignments and grades, to review course material and to submit work.

Our Special Education Department provides valuable services to our students. It's no surprise that our prioritization of Apple digital tools benefits Special Education students, but it may be a surprise to find out that these students benefit even more than regular education students. First, special education students' organizational skills are improved and reinforced daily as they use the iPad interface to a) eliminate bulky school materials and b) utilize features such as Reminders, Notes, Voice Memos, Calendar, to build adequate organization and accountability. Also, the digital tools we provide for our students increase accessibility to the even broader range of learning styles and abilities within the special education population. Students can access information in absolutely any form. They can replay, revisit and retry any materials given to them until they may achieve the same mastery that we expect from our regular education students. Finally, we use Apple tools that are available for the specific challenges that our special education students face, including color coding in readings, easy magnification, and speech-to-text on iBooks. Our special education team is part of all discussions regarding implementation of digital tools as they are accountable and enthusiastic about supporting our instruction, as well as student achievement.

Gallery: Students use iPads in different courses

A student using CoolSIS app on his iPad

According to Special Education Teacher Lynda Barrus, “I have a few students who struggle with getting thoughts down on paper, so they use the Voice Memos to record their voice when answering short answer questions, organizing their essays. After recording their responses they will either: a) email the response to the teacher; b) replay the response and type their essay; c) take notes from their recorded thoughts and re-record with additional information. We also use the notes and reminders with the students on IEPs. We have the high school students and a select few middle school students add reminders for homework assignments in the reminders. In the notes section they will add their usernames and passwords.”

Over the years, since receiving the Smart Technology School Grant, students and teachers at Beehive Science and Technology Academy transformed from novice technology users to experts in using Apple technologies for education. There are several tools that we are using inside and outside classrooms. Here are a few that stand out.

CoolSIS is the student information system that connects teachers, students and parents. Through CoolSIS, students and parents can track grades, assignments, upcoming work and tests and also behavior points. Teachers can submit assignments, grades, documents and links. They can submit positive and negative behavior points which will appear as notifications on parent mobile devices. Parents can contact teachers and ask about specific assigned materials. Students can see their assignments on the CoolSIS app on their iPads in a calendar format and plan their time accordingly.

Another tool is iMovie. For six years now, Beehive has been organizing the Utah STEM Expo, a free public event, where students share their STEM projects with the general public. In preparation for this event, students are required to complete specific steps about their project each year. One of the steps is to record a video about their project, edit it on iMovie on their iPad, and upload it to YouTube. Eventually, they embed their videos to the Google site they build about their project. By preparing a website and a video for a project every year, students slowly build a digital portfolio. Additionally, we run some contests to recognize the student websites with the most visitors, and student YouTube videos with the most views, likes, comments and subscriptions. These contests are intended to guide students to responsibly share their products with others, write appropriate comments and learn the basic skills to become digital citizens. Click here to see a sample student portfolio website.

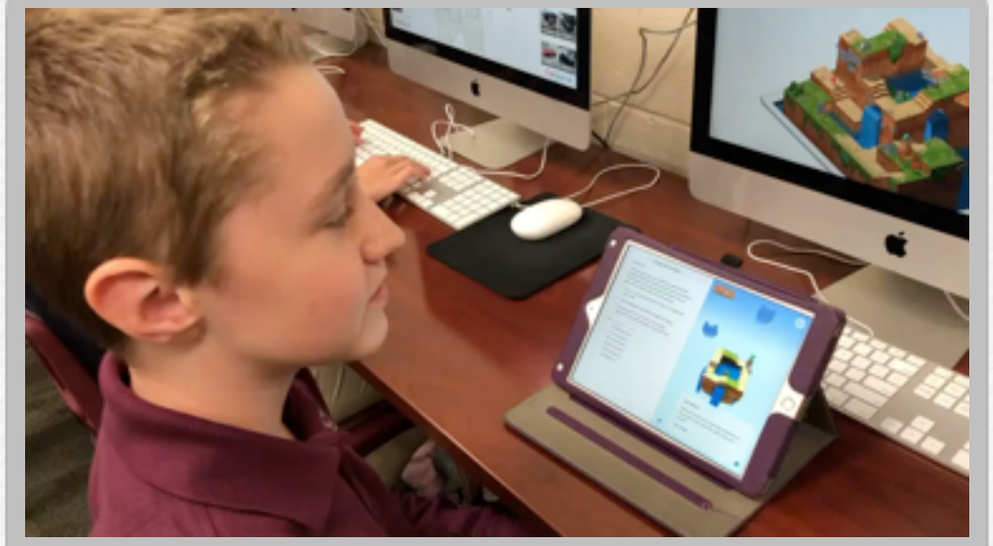
Utah STEM Expo 2016 Highlights

Beehive students have also incorporated Apple products including iMovie into such everyday activities as student newscasts and daily student announcements. When student elections are held, all candidates are required to produce a campaign film using iMovie. Simply stated, Apple products help drive the school's culture, clubs, productions, business, learning, teaching and more.

In addition to specific apps on student iPads, the availability of iPads in each student's hands enables teachers to look beyond the classic textbook. Our Science Department has been using the Science Techbook by Discovery Education in its instruction. This online platform provides students with content material in the form of text, videos, animations, simulations, virtual labs and interactive learning tools. Discovery Education supports teachers with instruction materials and assessment tools that make assigning, submitting and grading student work a breeze.

Beehive's Music Department uses Apple technology in allowing students to demonstrate their creativity. According to Beehive's Music teacher, Therese Musick, "Using Garageband, 6th grade students create, compose, and record a rap about themselves. They are able to explore loops and showcase their personality through music. We also do a music video project wherein students compose a one- to two-minute piece of music and use it as background music in iMovie to create a short video about a specific planet. This helps students connect music to technology and gives them hands-on learning and composing. In our ensemble electives, I use Airplay to show the

Music class uses GarageBand



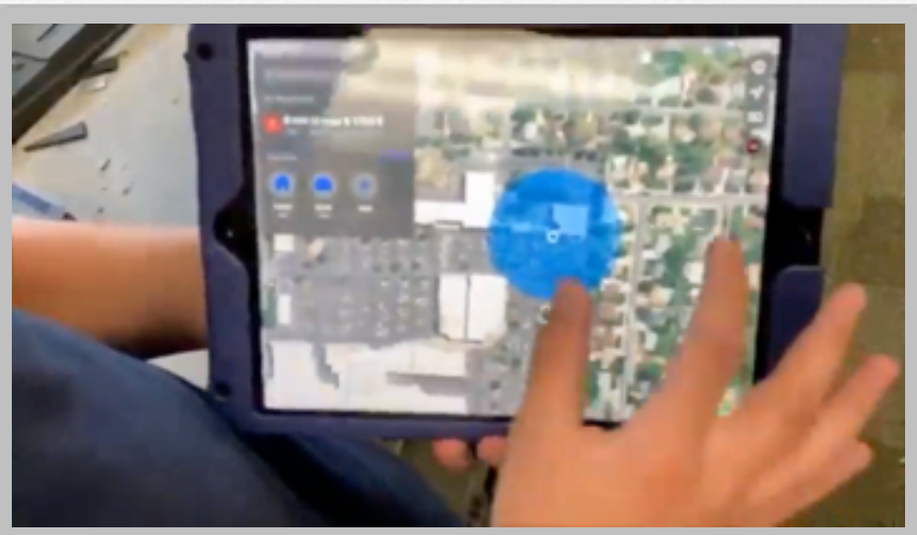
Middle schoolers' experience with Swift Playground

specific music we are rehearsing or a video that relates to what we are learning."

Computer Science teacher, Sumeyra Gul, is preparing students for the future by teaching coding. She said, "I am using Swift Playground which is an app to teach coding to students. There are different lessons and we started with Learn to Code 1. I am using it with 7th grade students during class. Plus, I use it with my female students during a Beehive after-school club called Girls Who Code. I've also played with Swift Playground before I introduced it to my students, and I loved it. It is interactive, step-by-step, and has clear instructions. Although, Swift Playground planned the lesson to stand alone, it still makes the lesson plans' teacher guides so they can be followed in iBooks. The lessons they have vary as well. After my students learn the basics to get used to the platform, and learn the language with Learn to Code 1 and 2, they can do much more, including Explore the Universe and Augmented Reality. I love it when I play with it, and my students love it too. I am glad we are providing this opportunity for them."

Beehive's Daniel Bryant teaches 6th grade classes in Flight and Space and Digital Literacy. He also serves as the school's Physical Education teacher. Recently, he's taken his students outside of the classroom to utilize Apple technology. He said, "This semester, we are using Apple Maps as an interface for students to prepare for a real trek outside. This trek includes scaling our solar system with our last planet in a local park, Big Bear Park, by our school. Since Neptune is 30.1 AU from the sun, that is set and then paralleled to the true 2,750 feet to the corner of the park where Neptune has been placed in a tree far away from the sun model in our classroom. All other planet sizes and distances are mapped out on a predetermined path, and we use maps to make an accurate scale and proportions. We are then able to measure real-life distances that help students understand the scale of our solar system. I.E. Our sun is a large volleyball with a diameter of ~10 inches, Jupiter is the size of a golf ball about 500 feet away from the classroom sun model, and Neptune resides as a small blue marble about 1 centimeter in diameter over a half-mile away. These sorts of experiences help students visualize the magnitude of things in interplanetary space and help them imagine further treks in future interstellar travel."

Bryant has also been using Facetime to take his students on virtual field trips. He said, "We want to jump into industry and see what professionals are doing in their fields. Students are also able to

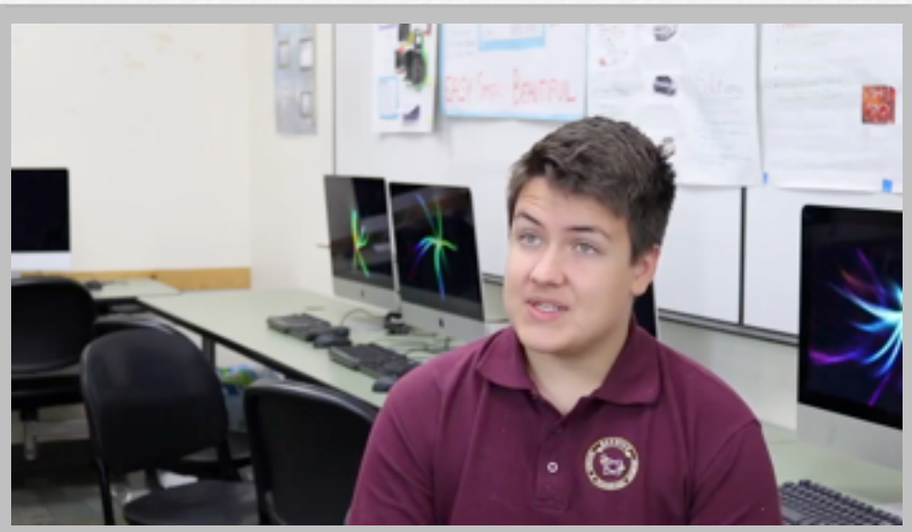


Sixth graders using Maps in Flight & Space Class

connect with other students in other countries in similar science foci. Later this year, we will be able to enjoy some tours and technical time with health professionals. Someone in their residency or clinical studies can bring us along with them for an hour with a doctor's session. We plan to see the OR in Stanford Medical Center and another hospital in Chicago with a doctor demonstrating surgical robots like Davinci. Students will also have the opportunity to jump into the tech industry while following along with software programmers in a big tech company like Facebook. Some aspects like work environment, company culture, desk space, cafeterias and laboratories will be showcased via FaceTime. Hardware engineers and computer scientists can take us along in a clean room without all the scrub down and hassle and show us the bare bones of computers, microprocessors, and super sensitive equipment that deals with raw silicon, transistor technology and other nanotechnology. Our students will be able to see lab work and follow along with an experienced senior engineer who helps design server architecture, cooling systems, network interfaces, etc."

The Math Department uses Khan Academy and ALEKS to support its teaching. Students can work on assignments, view support videos, and do mastery challenges to further their math skills. Math teachers can see students' results, and track them individually. This is all achieved on the iPad without using any paper.

The use of apps and online resources is not limited to our Math, Music and Science Departments. Many teachers eliminated their textbooks altogether, and all of our teachers started using some of the following apps or platforms in their classrooms: Apple products like Classroom, iMovie, Keynote, Pages, iBooks, Maps, Podcasts, GarageBand, Voice Memos, iTunes U, AirPlay and Apple. Additionally, Google Classroom,



High School Student experience

: Middle School Student experience

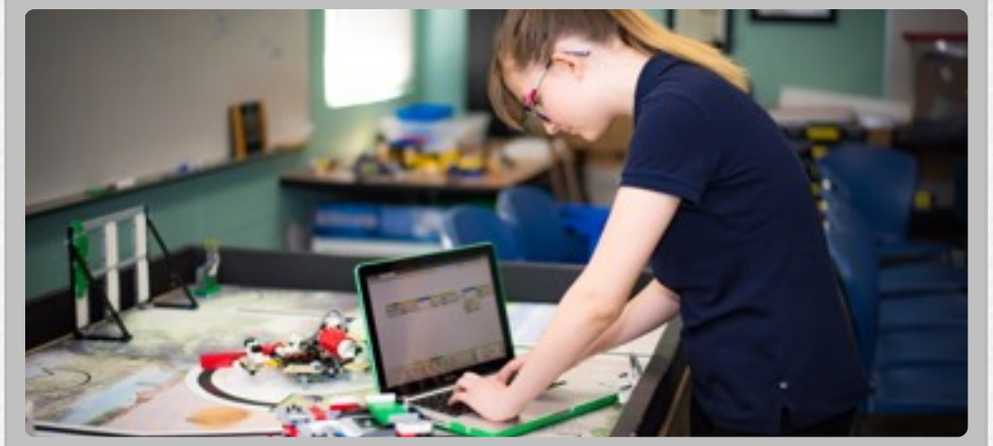
Canvas, Edmodo, Kahoot, Padlet, and Google applications are also widely used.

Lego robot in Language Arts
Press the robot to play video

Perhaps one of the most creative uses of technology was generated by the school's English teacher, William Mattison, by using iMovie. In an attempt to break away from conventional teaching methods involving books and classroom lectures and discussions, Mr. Mattison decided to utilize his students' other skills and technology savvy to create a short film based on the Franz Kafka novella, "The Metamorphosis." Simply stated, this project bridges literature, computer programming, design and videography to help students learn about this classic story. The class of 20 10th grade students was divided into a screenplay team (responsible for choosing the scenes, writing the script and providing the narration), a programming team (responsible for bringing robots to life in accordance with the needs of the scene), a design team (responsible for creating the set and designing the robot characters) and a videography team (responsible for filming and editing the scenes).

Beehive students and teachers also use Apple products extensively in after-school and extracurricular activities. According to Renae Mendenhall, Beehive's First LEGO League robotics coach and home visit coordinator, "Within our class and competition team, we use Keynote on our iPads and Macbooks. Keynote provides my students a professional look to their presentations that are given to judges at state-level and international-level competitions. Because we are a competition team, the collaboration aspect of Keynote guarantees that everyone can be hands-on in the development of our presentation. Keynote gives my students valuable and necessary skills for college and for the professional world. Lastly, my students have enjoyed all the fun and creative things they can do with Keynote in comparison with the time-consuming and less interactive posters that we have done in the past." It should be noted that during the past few years, Beehive has consistently had First LEGO League teams advance to, compete in, and place in several international competitions.

Gallery: Students using technology



Student using a MacBook Pro for Lego Robotics

Middle schoolers using Keynote

At Beehive Science and Technology Academy, we value utilizing the digital tools available to us in ways that support engagement, self-efficacy, responsibility and curiosity from our students. The key to achieving and maintaining the peak digital learning environment for our students is a balance between supervision and trust, instruction and exploration, guidelines and freedom.

We are able to accomplish this, and will improve upon our model through the following:

-Extensive iPad and electronic use policy.

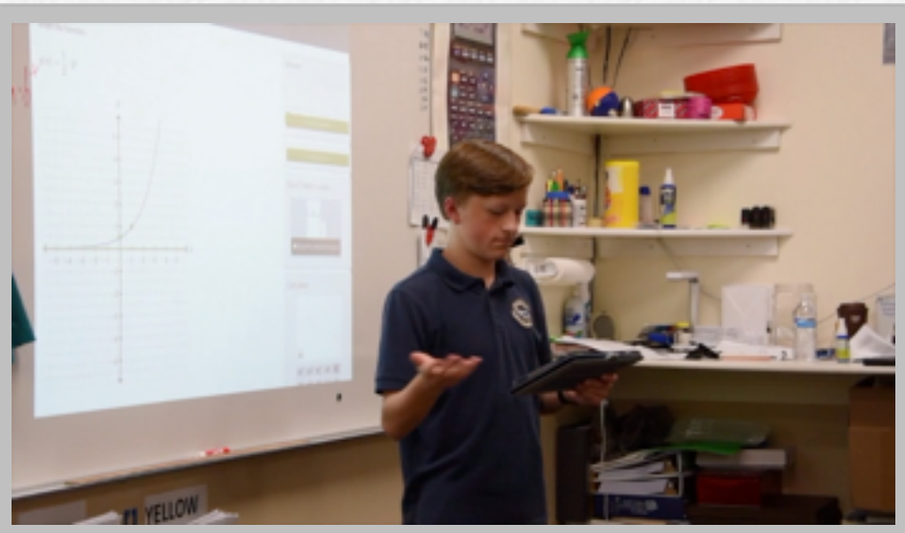
-Teacher trainings on effective usage, implementation, and new tools.

-Engaging students with digital tools, allowing for differentiation in pacing, coursework, outcomes and assessment.

-Students trained on digital citizenship and responsibility, as well as opportunities and capabilities. Utah Education Network resources and NETSafe Utah resources and trainers are utilized to provide these trainings. (Utah Education Network connects school districts, school and higher education institutions to a network of resources. NetSafe Utah provides online videos and resources for kids, teens, parents and educators, including internet safety information that Utah schools need to meet the Children's Internet Protection Act requirements.)

-Parents trained on policies and procedures to assist in encouraging maximized responsible use of devices and tools within.

-Continued use of social media platforms such as Facebook, Twitter, Instagram and YouTube for publishing and sharing school-wide information with students, families, friends, the local community as well as the global community.



A student teaching his peers using Airplay

Teaching

Teaching

Apple technology has proven to be an integral part of Beehive Science and Technology Academy's internal and external continuing education programs for faculty and staff. Apple technology has also been essential in enhancing class curriculums.

Professional Learning

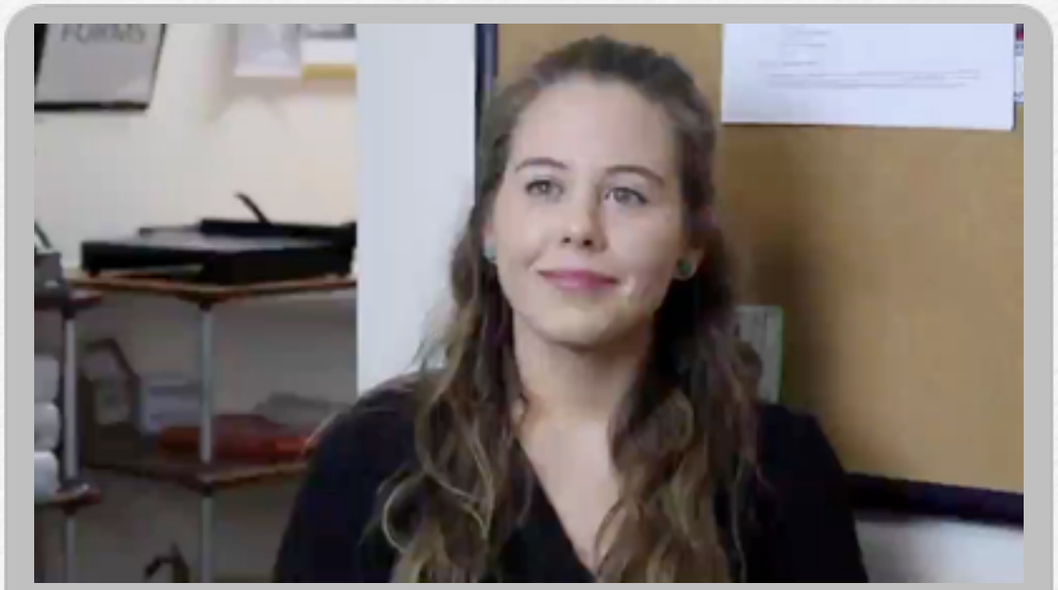
The entire Beehive Science and Technology Academy faculty has used MacBooks and iPads since 2013. Initially, Apple products were primarily used in science and technology classes. Since then, Beehive's faculty has incorporated Apple products into all of the school's disciplines. As previously noted, each and every Beehive student has access to iPads.

Since Apple products and tools are key to Beehive's teaching and learning processes, the school has emphasized ongoing Apple-related training, professional practices, collaboration and building capacity in advancing staff capabilities. As evidenced by consistently improving state test scores since Beehive implemented school-wide access to iPads, Apple products and tools—combined with effective teacher use of these technologies--have substantially and positively impacted student learning, engagement and creativity.

Throughout the year, as part of the school's professional learning, each staff member is offered extensive training centered around Apple products and tools. What's more, each new teacher is appointed a mentor to ensure that all key personnel are up to date on Apple technologies that are an integral part of Beehive's day-to-day teaching, learning and administrative functions. Beehive typically offers its staff members 20-plus days of technical training focused on Apple technologies, including Apple Classroom, Keynote, GarageBand, iMovie, Note, Reminders and Swift Coding, among others. Staff members also use Apple products and tools in their ongoing professional growth through best practice sharing, goal setting, best practices implementation and transparency.

Beehive also requires its teachers become Apple certified. This certification helps ensure that faculty members are well-versed in implementing Apple

Teachers in department meeting



New English teacher sharing experience

technologies in teaching and student learning. Currently, 91 percent of Beehive's teaching staff is Apple certified.

Of course, not all professional training occurs in Utah. As members of a current Apple Distinguished School, three of Beehive's teachers will be attending the upcoming Reimagining Learning workshop at the University of Southern California Oct. 9 and 10, 2019.

According to Beehive Principal Hanifi Oguz, "We decided to become an Apple school based on the many available educational resources that are offered. The Apple products have transformed the way our teachers teach and our students learn."

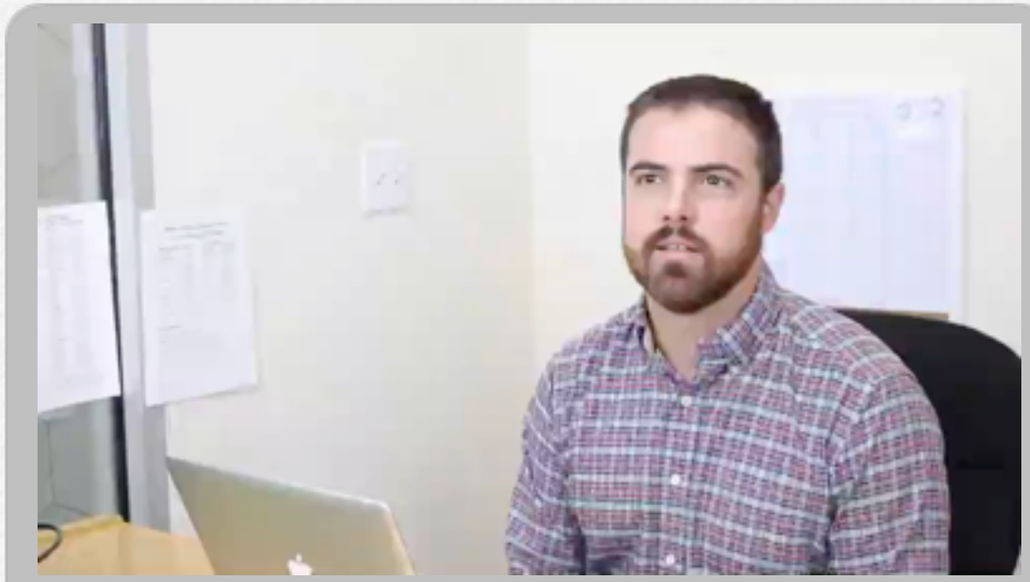
Beehive's staff members continue their professional development through internal and external continuing education programs. Several teachers hold a master's degree and some are working on a doctorate degree. In fact, one of the newest members of the Science Department, Kristina Pavlovic, holds a Ph.D. in Biomedical Engineering. Similarly, the math department chair, Emre Gul, recently completed his master's degree in Math Teaching.

Besides Beehive's own in-house training sessions, the school's faculty and staff have attended numerous local and national conferences including ASCD Empower Conference, ASCD Leadership Conference, National Charter School Conference, Visible Learning Conference, Utah Charter School Conference and CTE Summer Conferences. In addition, Beehive employees are scheduled to attend the upcoming NCTM Conference, CSforAll Conference and the NSTA Area Conference.

Humanities Chair sharing experience

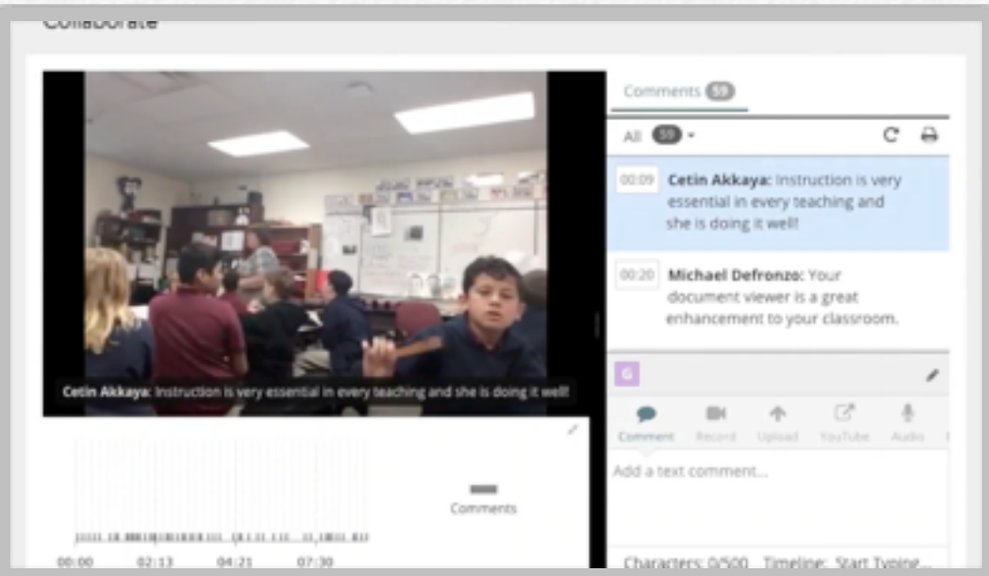
Professional learning is key to expand our understanding of technology integration in our education. Beehive Science and Technology Academy is utilizing the Edivate platform through Utah STEM Action Center to provide individualized, high-quality professional development to its teachers, administrators and support staff. They have access to quality videos and resources that they can utilize to develop individual learning goals . Teachers have access to resources on curriculum and technology integration, content-specific materials and students' learning through digital resources.

New joining teachers are provided specific Apple technology use, technology integration and use trainings during the summer in-service days trainings by our IT team. The experienced teachers within specific departments are teamed up to mentor and support the new teachers.



Social Science teacher sharing experience

The Edivate observation tool is also utilized to provide feedback to teachers. It also facilitates peer collaboration and feedback sharing. Teachers use iMovie to record their classroom instruction video on their iPad. After they edit their video, they upload video to the Edivate platform for other teachers and administration to watch and comment on. This process helps teachers get real-time feedback to help improve their teaching.



Teachers using Edivate for video feedback

Instructional Design

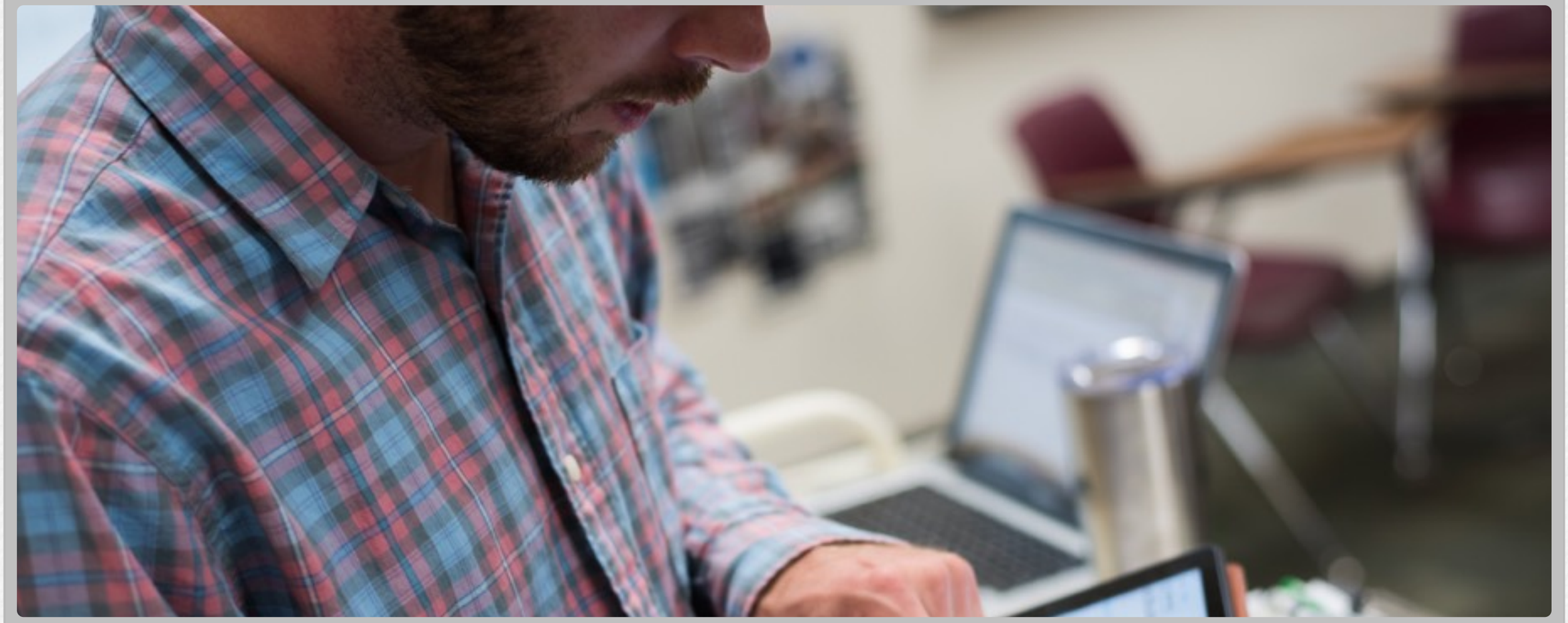
At Beehive Science and Technology Academy, each of our educators enjoys a level of freedom to enhance his or her curriculum through the implementation of digital tools. Frequent collaboration between our educators allows for sharing effective strategies and refining the process of implementation. Continued hardware upgrades and additions, software and trainings allow our staff to remain a highly effective school in the ways of digital teaching and learning. Leadership from our administration, computer staff and school transformation team (per Assessment to Achievement) ensures accountability and continual growth.

Our staff members are committed to using Apple digital tools with fidelity, rather than arbitrarily, i.e. using technology for the sake of using technology. The hardware and software implementation at Beehive Science and Technology Academy is meant to address standards, produce growth in standardized testing, and to reflect real-world scenarios. An app as simple as the Opinion Podcast Creator is a fine example in addressing speaking and listening standards as well as any relevant content standards across the curriculum, giving students an opportunity to produce discourse in an alternative fashion, as well as allowing them to tap into a medium that is frequently used by educated adults to receive and spread new information. Our Science Department has incorporated virtual reality headsets to allow students to experience the cosmos, landscapes, the inside of a cell, etc. The list goes on.

Virtual Reality in Science Class on the News

Using digital tools with fidelity certainly presents its own set of challenges, many of which we have much experience in mitigating at this point. The challenges related to digital teaching stem from providing a network to 300-plus students and faculty, depreciating hardware, the learning curve with the introduction of each new resource, balancing freedom to explore with reasonable supervision and boundaries, and catering to different abilities and learning styles. Identifying the challenges is obviously integral in addressing them, but

Gallery: Teachers using Apple Technologies



Teachers using Apple products in the classroom

from the point of identification springs the solutions, rapidly. Each member of the staff knows who to approach for any problem, and who to include in the conversation, i.e. network issues and hardware issues go to our computer teachers, and that conversation also includes our admin team for support. Implementation or differentiation questions are generally directed toward our School Transformation Team that either provides ideas, observations or training.

Environment

Environment

New technology and Apple products are enhancing the student learning environment at Beehive Science and Technology Academy.

Learning Spaces

Perhaps more than any other school in Utah, Beehive Science and Technology Academy is using new technology and Apple products to enhance the student learning environment.

Since the 2013/2014 school year, all Beehive Science and Technology Academy students have had access to iPads. Since that time, the school's standardized state test scores have experienced a notable increase.

Concurrent enrollment, online learning, AP classes and advanced CTE courses are available for Beehive's high school students.

Senior student experience

Humanities teacher sharing experience

Infrastructure Design

In addition to the student iPads, the school now has Apple TVs and projectors in all of its classrooms. Each of the teachers has MacBook Pros and iPads to use in their instruction.

Beehive Science and Technology Academy has two iMac labs (the school also has a media library with PCs, which is available to all teachers).

Teachers are informed and trained about new applications and technologies, so that they can decide which ones will benefit their instruction most. Then, they make requests about the apps they would like their students to have available on their iPads for each school year.

The following Apple products/programs have been, or are being incorporated into the instruction at Beehive Academy.

- iMovie used across the board in all classrooms
- iBooks used especially in Humanities department
- Apple Classroom used by all teachers
- Apple Playground/Swift is used in middle school computer science classroom
- Pages, Keynote, Reminders, Notes, Maps, Calendar, Mail, Voice memos, GarageBand, Screen Record and iTunesU are used in several classes
- Additionally, the computer department uses Apple School Manager, Apple Open Directory. and Remote Desktop to manage iPads, MacBooks and iMacs across the school.

While Apple products/programs dominate the school's learning environment, it should be noted that other technology-based items include:

- Sound systems in most classrooms
- 3D printers in some classes
- WiFi network is available in all three buildings that make up Beehive Science and Technology Academy's campus.
- With the WiFi network, 24 Aruba Access Points are placed all around the campus.
- Robotics / LEGO equipment is available for teams
- Classroom Management Systems: Canvas, Google Classroom, Edmodo are being used by teachers
- Similarly Khan Academy, Google Apps (Drive, Docs, Slides, Sheets, GMail, Sites), Goodreads, Evernote, Discovery Education, Educreations, CoolSIS, Sketchbook, Kahoot, Pearson eText, First Aid, Stop Motion Studio, Wind Tunnel, Voice Dream Reader are some apps or platforms used in various classrooms.
- G Suite for Education (Google) accounts for all students and staff members

Sixth grader's experience with iPad

Results

Results

Surveys conducted among Beehive Science and Technology Academy students and faculty revealed that Apple products are having a significant positive impact on learning and teaching.

Research Practices

The Beehive Science and Technology Academy staff is also participating in “Assessment to Achievement,” which is a five-year program focusing on effectively using relevant data to improve student outcomes. This training is sponsored by Utah State Board of Education and Ed Direction. Ten staff members are being trained directly. They in turn train our remaining staff. Teams increase their own expertise in analyzing data gained from student outcomes, and by using these skills to inform instructional and program decisions and improve student achievement. Participants will collaborate as school teams to analyze the data and implement school-wide strategies. These teacher teams attend over 10 full days of training per year. Our staff is specifically focusing on “Metacognition” with our students teaching them to think about how they think. We are now approaching the end of our fifth year of implementation of this program, and we are seeing very positive results in student learning. In addition, we have been implementing effective questioning, feedback and collective efficacy as part of our evidence-based instructional strategies.

Of course, this training translates into improved instruction in the classroom in all subject areas. Here are just a few of the innovative ideas now being implemented at Beehive Science and Technology Academy:

-Departmental Collaborative Teacher Teams collaborate to create instructional rubrics, which are used in all departments. Students are assessed weekly on writing-specific skills in each content

STEM School Designation on the News

area. Each department built its own rubric for an assessment based on a model rubric created in the Math Department. Students are provided with a similar rubric before they begin writing, and students self-assess their writing as a way to build metacognitive skills.

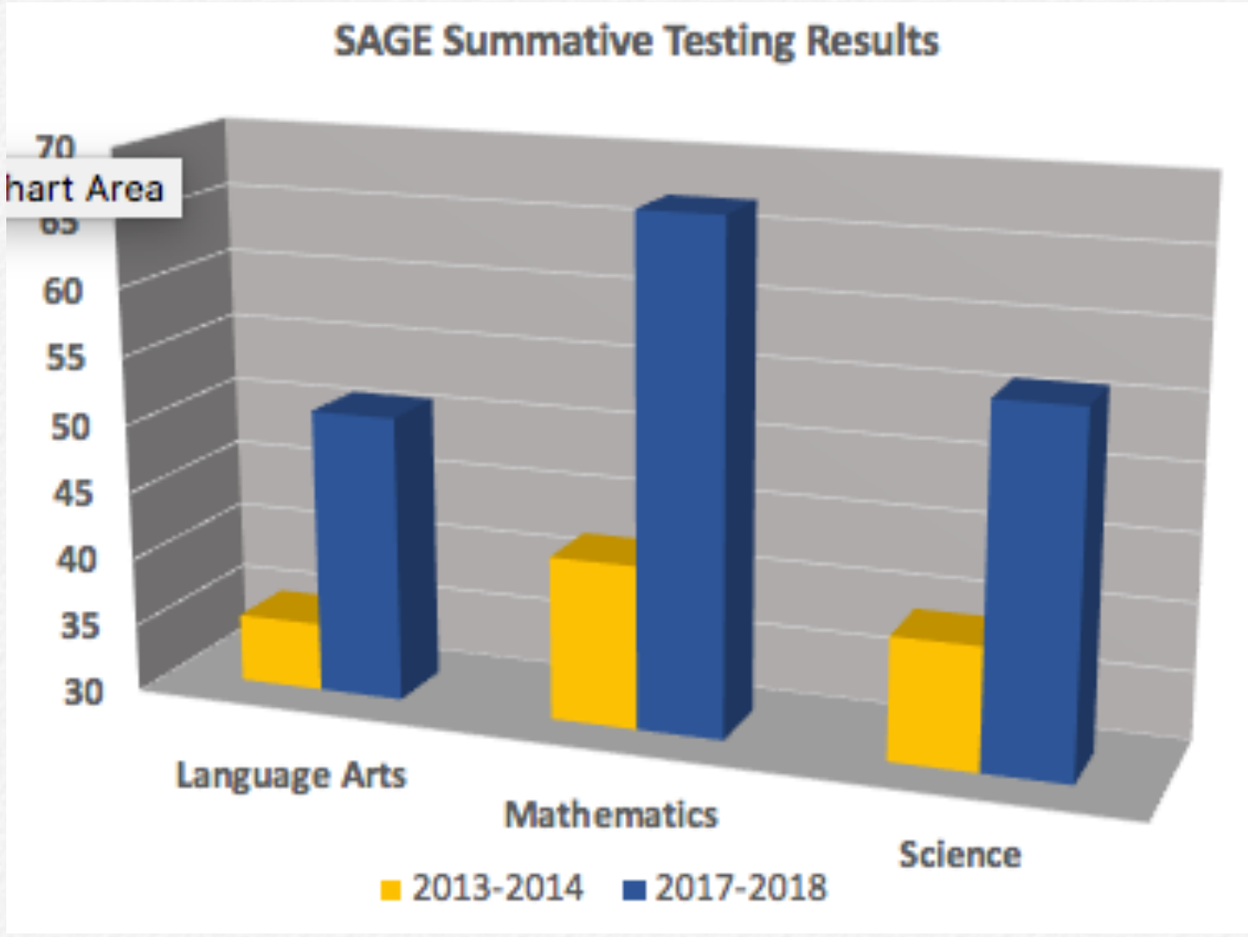
The rubric becomes a means of instructing students about what is expected of them.

-Grade Level Collaborative Teacher Teams and Department Collaborative Teacher Teams meet on alternating weeks, one meeting each week. All Beehive Science and Technology Academy teachers participate in Collaborative Teacher Teams. At Grade Level Collaborative Teacher Teams meetings, teachers discuss Learner Centered Problems and collaborate on strategies to improve student proficiency in the LCP (Learner Centered Problem) and other specific areas. This includes much collaborative curriculum planning across all content areas in our school, including the elective courses.

Beehive Science and Technology Academy teams routinely check student behavior data, attendance data, engagement data, parent SIS (Student Information System) login data, safety data, communication data and more to identify the trends and needs to improve its processes. Stakeholders' surveys are conducted annually. In addition, many different specific surveys and data gathering procedures are implemented as needed.

Beehive Science and Technology Academy's school board contracts with professional agencies to conduct annual SWOT (Strength Weaknesses Opportunities Threats) Analysis to identify the improvement areas and strengths to align its strategic plans. All data resources and stakeholders' feedback help the school create goals and action plans to achieve its shared vision.

In tracking Beehive Science and Technology Academy SAGE (Utah state testing between the years 2013 and 2018) results over the past five years, school administrators discovered that since the iPads were introduced, test scores increased by 16 percent in English, 25 percent in math and 17 percent in science.



Recently Beehive Science and Technology Academy conducted surveys about students' and teachers' opinions about iPads in the classroom. A total of 219 students and 15 teachers answered the surveys.

The breakdown of students by class was 43 sixth graders (19.63 percent of the total), 47 seventh graders (21.46 percent), 55 eighth graders (25.11 percent), 29 ninth graders (13.24 percent), 26 10th graders (11.87 percent), 15 11th graders (6.85 percent) and four 12th graders (1.83 percent).

When asked, "Do you think you are more engaged or less engaged in your classes when you are using your iPad?," 49.77 percent responded more engaged, 43.32 percent said it was about the same, and only 6.91 percent said they were less engaged.

Results from the question, "Do you think the iPad makes classes more interesting?," 69.41 percent said it was more interesting, 25.57 percent said it was about the same, and only 5.02 percent said it was less interesting.

When asked, "In general, thinking about how your teachers use the iPad in their class, is their use about right?," 77.88 percent said they thought it was about right, 17.97 percent said it should be used more, and only 4.15 percent said teachers should use iPads less.

Finally, when students were asked, "Do you agree with this statement? "I think having an iPad improved my learning.," 28.31 percent strongly agreed, 44.29 percent agreed, 14.16 percent were neutral, 9.59 percent somewhat agreed, and only 3.65 percent disagreed.

Students were also given the option to comment about their iPad experiences at Beehive Science and Technology Academy. Some of these comments included:

"I think the iPads really improve my learning and help me more clearly understand. It also helps us not use as much paper."

"The iPad lets us interact more and collaborate."

"It makes me way more engaged."

"It really helps me focus and get my homework done."

"It's a great tool, but it can be abused, and can be distracting to students."

Teachers analyzing data using Apple technology

“As well as being good learning tools, they can also cause distractions, but the advantages tend to outweigh the disadvantages.”

“They are really easy to use, and at least my hand doesn’t hurt from writing all the time. Another good thing is that with the iPad, I can spell better than I could on my own.”

“It makes me want to do my homework.”

Teachers’ responses to iPads were also extremely favorable, although usage in the classroom varied considerably.

When asked, “How much time do students in your class use iPads every day?,” 28.57 percent said 0 to 15 minutes, 50 percent said 16 to 30 minutes, and 21.43 percent said 21 to 45 minutes.

Comments from teachers on this question included:

“They have been a great teaching tool.”

“Students are distracted still. I don’t think you can get away from that. But I can keep them engaged longer and information is right where I need it.”

“I love how much paper it reduces. Plus, you don’t get the ‘lost homework’ excuse. If there is no paper to lose, you can’t lose it.”

“The iPads are a great tool that make my teaching easier.

I can make the curriculum so much more interesting and effective when each student has one.”

Teachers view iPads as a positive feature in the classroom. When asked, “To what degree do you agree with the following? Students are excited and engaged in learning with iPads?,” 66.67 percent strongly agreed and 33.33 percent agreed. These numbers were duplicated when teachers were asked to respond to the statement, “I am excited about using the iPads as a teaching tool.”

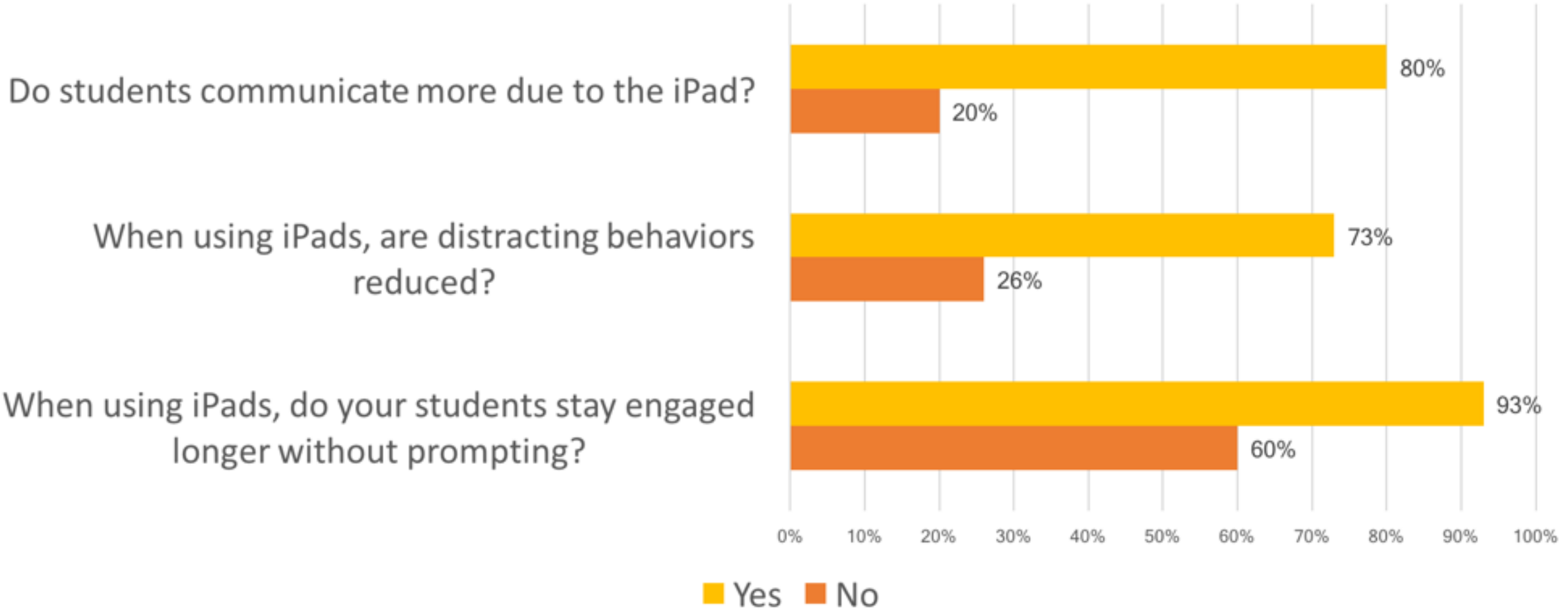
There were also no negative answers when asked about if “I have seen measurable improvements in my students’ learning outcomes because of iPads.” Some 40 percent strongly agreed, and 60 percent agreed. Not one teacher checked neutral, somewhat agree or disagree on this question.

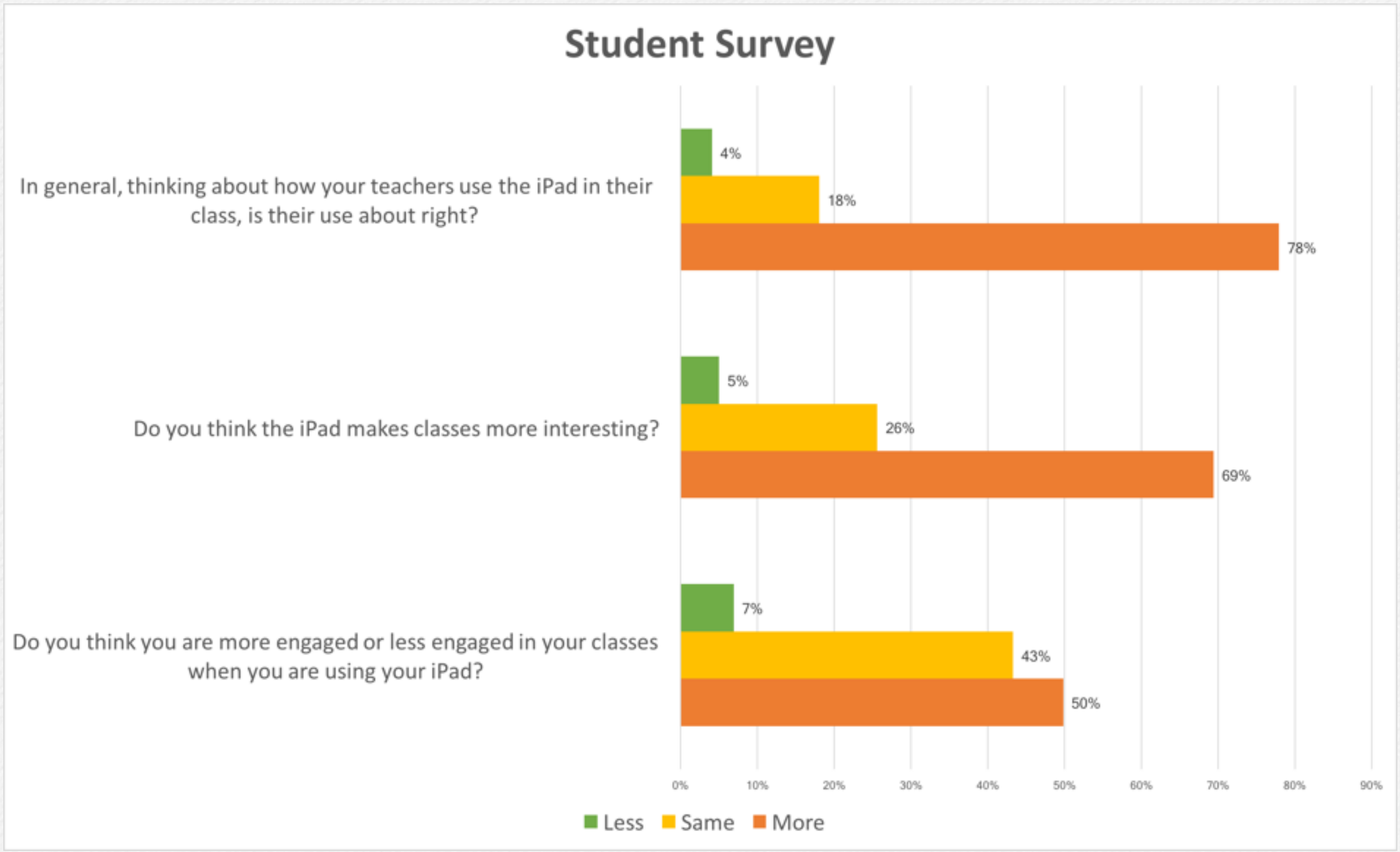
On the question, “When using iPads, do you students stay engaged longer without prompting?,” 93.33 percent said yes, and only 6.67 percent said no. In a somewhat related question, “When using iPads, are distracting behaviors reduced?,” 73.33 percent said yes, and 26.67 percent said no.

Most teachers also said iPads improved communication. On the question, “Do students communicate more due to the iPad?,” 80 percent said yes, and 20 percent said no.

Finally, when asked to respond to the statement, “I feel supported with professional development on iPads/technology in the classroom,” 26.67 strongly agreed, 53.33 percent agreed, 13.33 percent were neutral, 0 percent somewhat agreed and 6.67 percent disagreed.

Teacher Survey




Student Survey
In general, thinking about how your teachers use the iPad in their class, is their use about right?
4%
18%
78%
Do you think the iPad makes classes more interesting?
5%
26%
69%
Do you think you are more engaged or less engaged in your classes when you are using your iPad?
7%
43%
50%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
Less
Same
More

We are Beehive! (Video made by students)

Contributions and Credits

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