



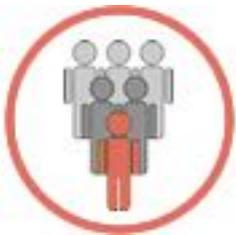
OUR JOURNEY OF LEARNING



Welcome to the Science, Technology, Engineering, Arts and Mathematics (STEAM) program at West Ferris Intermediate & Secondary School in North Bay, Ontario, Canada.

We encourage students to be innovative and enthusiastic through opportunities to explore cross-curricular relationships between all core subjects. Fundamental principles in the program develop students' skills in problem-solving, analysis, experimentation, synthesis and communication. With a MacBook and an iPad, our students use modern Apple technologies in a 2:1 setting to facilitate, enhance and redefine instruction of the curriculum in our 14 STEAM courses.

We continue to define "The Evolution of Learning".



Vision

Vision

The STEAM program continues to grow and experience great success due to the shared vision and collaboration between the STEAM department teachers, STEAM students, parents and the school administration.

The overarching vision for the STEAM program is rooted in the importance of creating a flexible learning environment. We have continued to focus on the integration of cutting edge technologies into our classrooms with an unwavering dedication

to providing the best educational experience possible to our students.

STEAM is a dynamic program that provides very unique learning opportunities for students. No two courses have ever been taught the same way. Courses continuously evolve from semester to semester and from year to year based on the emergence of new technologies, enhanced teacher experience, feedback from the students and their parents, and expanded collaboration between STEAM department teachers.

We, the stakeholders of the STEAM program, recognize and embrace the fact that technological innovations continue to change the way that we all live and work more and more and in some ways very drastically. We recognize that there is a paradigm shift in society, in the next 10 to 25 years there will be a revolution in how we work that will lead to the elimination of

many jobs due to the advances in artificial intelligence and robotics. As society changes, so should our pedagogical practices, and we recognize that the classroom of yesterday will not help our students prepare for the jobs of tomorrow.

Role of Key Stakeholders

Teachers

1. STEAM teacher lead by example and role model best practices in terms of technology usage.
2. Are committed to ongoing professional development and eagerly seek out opportunities to expand their knowledge of and skills in their specific subject area as well as the use of new emerging technologies.
3. Prepare and deliver innovative and engaging lessons.
4. Provide students with opportunities to be creative and innovative problem solvers.
5. Provide the students with the opportunity to learn how to successfully collaborate with their peers.
6. Provide students with the opportunity to take on leadership roles within the classroom.
7. Provide students with the opportunity to help refine and design new assessments and assignments. Student voice.

Students

1. STEAM students will lead by example, role model best practices in terms of the use of technology and become technology experts for the entire school.
2. STEAM students will take responsibility for their own learning, self-advocate, and exercise self-efficacy.
3. STEAM students will fully engage in learning process by striving to surpass curriculum and classroom expectations using digital resources demonstrated in class as well as those that they discover on their own.
4. STEAM students work towards mastering the ability to work collaboratively with their peers both in person, and through the use of digital tools such as FaceTime, Skype, Periscope, shared files, etc..
5. STEAM students will take on leadership roles within the class and the school and work towards become effective team leaders.
6. STEAM students will learn to become experts at communicating their thoughts and ideas with and without the use of technology.
7. STEAM students will provide their teachers and the school administration with descriptive feedback of their experiences and suggest ways that the program can be further improved.

“My overall impression of STEAM is that it was an amazing experience. If I had the opportunity to do it again, I would. I’m sad that it is over, but I have lifelong memories that I will have forever”

Katie Schankula
STEAM Student



Parents

1. STEAM parents will be actively engaged in their son or daughters learning throughout the STEAM program.
2. STEAM parents will provide the STEAM leadership team with descriptive feedback of their experiences and suggest ways that the program can be further improved.
3. STEAM parents will actively engage in ongoing communication to with the STEAM leadership team to ensure the success of their child.
4. STEAM parents will be active advocates for their children, the school, the STEAM program and the learning community.

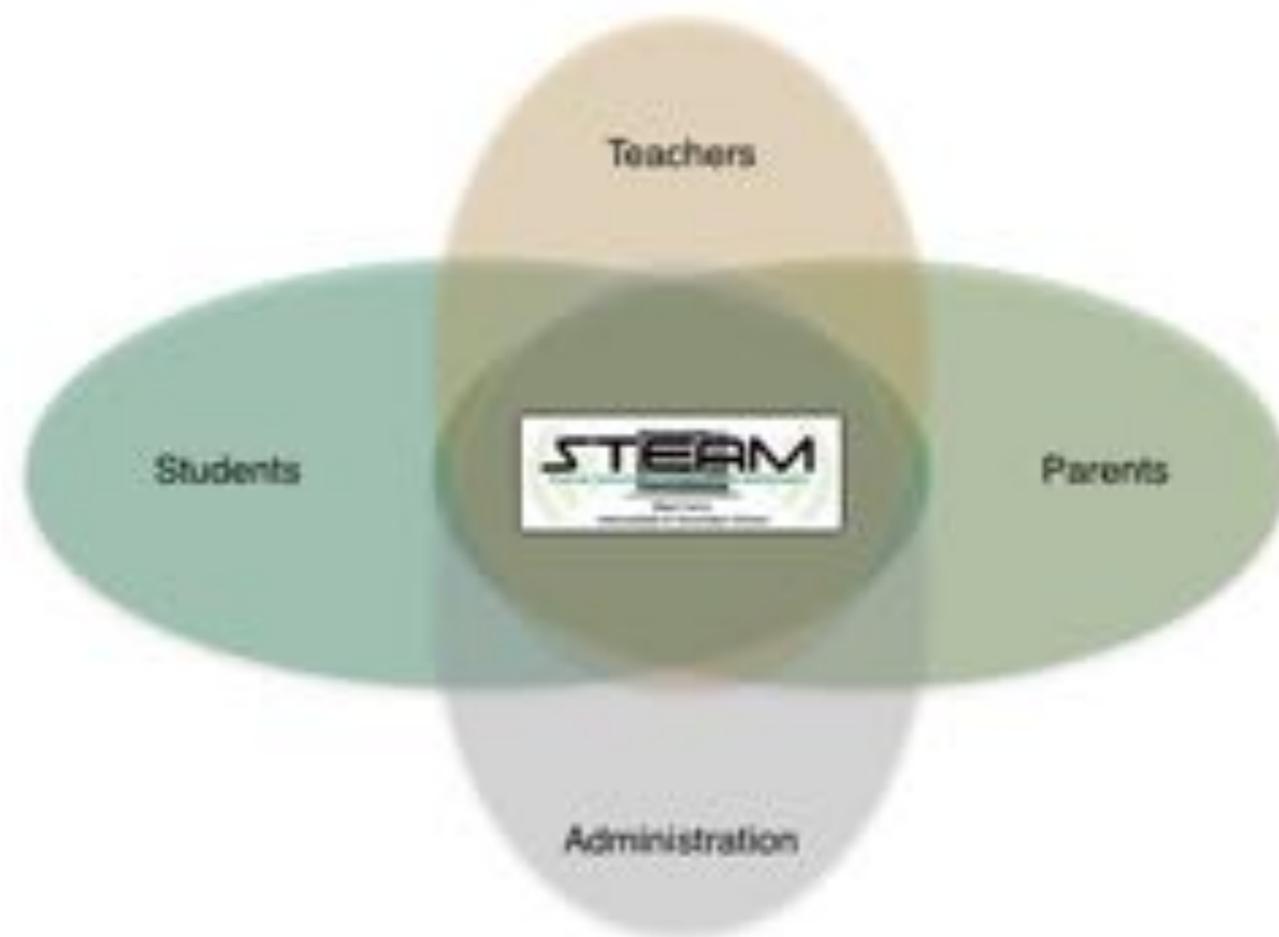
Administration

1. Actively support the STEAM leadership team by providing time, resources, and advice.
2. Provide the STEAM teachers with opportunities to engage in ongoing profession learning to expand their knowledge and skills on current and emerging technologies.
3. Provide STEAM leadership team with descriptive feedback of their experiences and suggest ways that the program can be further improved.

“The future of learning for students will be technology oriented and the present opportunities offered by schools like ours display that we are leaders in education. The STEAM program at West Ferris Intermediate & Secondary School proves to me that technology-based academics has been one of the best experiences available for my children. I have had two sons enrolled in the STEAM program and they continue to utilize all the skills and resources they have been taught. Being involved in STEAM has allowed them to forge friendships and bonds they will never forget with students that have similar inspiration and passion for technology and learning. This program has built confidence and initiative in both of my sons and I am convinced that these traits will carry on with them as they head into post secondary education. Technology-based learning and the Apple products provided through the STEAM program are invaluable to the growth at West Ferris and an integral part of the future of our school.”

Katharine Strang

STEAM Parent & Parent Council Representative



Goals and Sustainability Plans

The Near North District School Board has designated STEAM as a flagship program for the board, and continues to provide the financial support necessary in order to sustain the technology requirements of the program.

The school administration recognizes and strongly supports the fact the vision of the program and its goals are driven by the STEAM teachers, and students. The STEAM program exists because of the students, and for that reason all of the stake holders believe that student voice should play a major role in driving the vision, and overall goals of the program. This last point is reflected in some of the most recent changes in the program that lead to a broadening of the use of cutting edge technology through the creation of a STEAM art course, the addition of two senior level STEAM iCoach and Technology Design courses, and the addition of a STEAM co-ed physical education course.

The STEAM leadership team meets several times over the course of the school year to evaluate the overall effectiveness of the program and to suggest possible changes for the future. The integration of newly emerging technologies is frequently discussed and STEAM teacher collaborate with the rest of the learning community to determine how to integrate these new technologies into the classroom. Our commitment to embracing change and finding new ways to improve the educational experience of our students ensures that the STEAM program continues to define the evolution of learning.

Apple recognizes a second West Ferris educator

Apr 26, 2017 8:30 AM by: BayToday Staff



The STEAM team. Supplied photo.

Apple has added Ryan Culhane to the ADE Class of 2017. He joins Brent Yacoback (ADE Class of 2015). Both Ryan and Brent are STEAM (Science, Technology, Engineering, Arts and Mathematics) teachers at West Ferris Intermediate and Secondary School.

The Apple Distinguished Educator (ADE) Program began in 1994, when Apple recognized K-12 and higher education pioneers who are using a variety of Apple products to transform teaching and learning in powerful ways. Today it has grown into a worldwide community of over 2,500 visionary educators and innovative leaders who are doing amazing things with Apple technology in and out of the classroom says a news release from the school board.

The STEAM Program at West Ferris Intermediate and Secondary School is recognized as an Apple Distinguished Program for 2015–2017. The STEAM program, available to students in grades 7-12, integrates Science, Technology, Engineering, Arts and Mathematics with a focus on project-based learning. STEAM students are co-learners with their peers and teachers using cutting edge computer technologies. Learning in the STEAM environment encourages students to become critical thinkers, problem solvers and leaders.

The program has taken on several different names since its inception as the ST-21 program in 1992. In 2005, ST-21 was transformed into the ST Wireless Program with the inclusion of student laptops as the main learning tool. In 2009, further enhancements included the movement towards Apple MacBook Pros and iPod Touches.

STEAM in the news





Learning

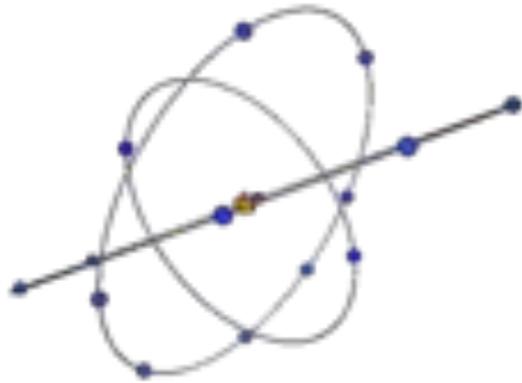
Student Learning

One of the guiding principles of the STEAM program is to look beyond the curriculum and help students become master learners. We strongly believe that students who are capable of extending their learning are confident in their ability to engage in critical thinking and learn through inquiry-based processes. We believe that it is critical to ensure that the students develop all the skills necessary to become self-sufficient learners. STEAM students leverage the use of a wide range of Apple devices and applications, to creatively construct exemplary products in every subject discipline.

The learning process in each course is deliberately designed to be student centric, with an emphasis on self-directed and collaborative learning wherein the teacher acts more as a facilitator, supporting the students through their learning investigations. STEAM students learn to challenge the teachers, and challenge ideas. The students frequently engage in self-reflection and exhibit excellent problem-solving resilience. When STEAM students are faced with an obstacle that they need to overcome, often their first response is discuss the obstacle with their peers and work together to research a solution.

STEAM Students build their own learning through the completion of immersive inquiry based projects that require students to work with a wide range of software applications. Their creation of digital constructs allows them to communicate

their thoughts and ideas with their teachers and peers and demonstrates their knowledge of the course curriculum.

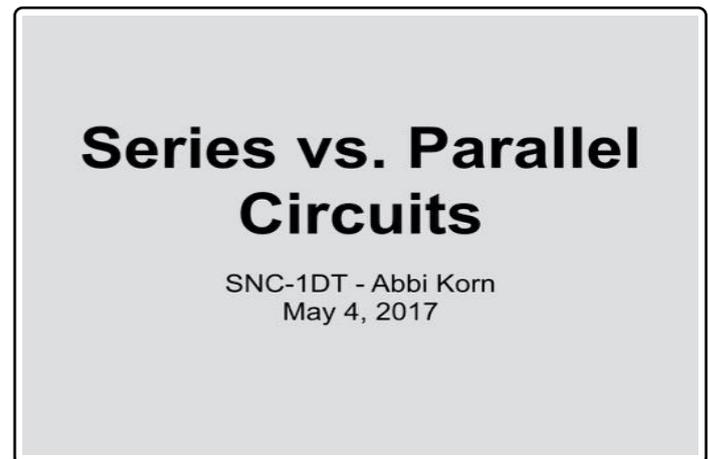


Student-generated 3D Bohr Diagram

Typical inquiry based projects start with guiding questions that require the students to research a topic and focus on assimilating new skills and knowledge. For example, students are often required to demonstrate their understanding of these new concepts through the creation of an interactive multitouch book, Keynote presentation, or video.

Completion of these projects often requires the students to compile many different digital artifacts that they have created. For example the creation of a Keynote presentation could also require the student to incorporate the use Pages, QuickTime and Numbers. Pages would be used for compiling research notes

and for sharing them with group members via airdrop. Numbers might be used to create charts or graphs to organize results from experiments and then QuickTime or Photo Booth could be used to screen capture how a math or science problem is solved. Photoshop might then be used to create graphics in the form of diagrams or illustrations to be included in the presentation. Students might also be required to use Garage band to create music for their presentation, or for the creation of audio files to include narration for each of the slides of the presentation.



"Gaining STEAM"

As a new feature during the 2017 school year, the STEAM program focused on increasing our community involvement through a program called Gaining Steam.

Each member of the STEAM program created a cross-curricular technology project suitable for grades 1 through 8. In a joint collaboration with various elementary schools in our community, the STEAM students were able to spend the day at each school teaching various elements of technology. Elementary students



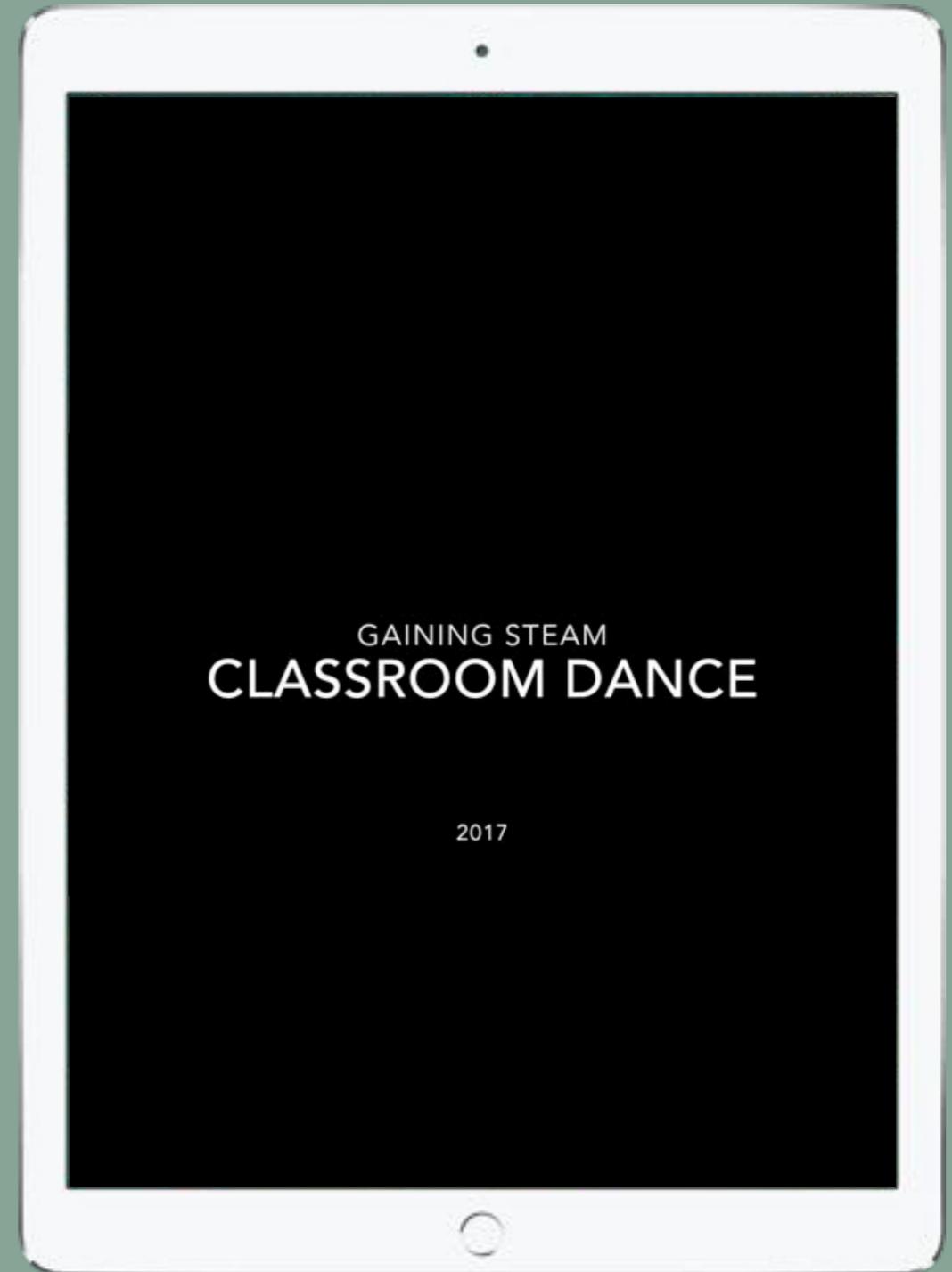
were introduced to angles and degrees using Spheros, stop motion using iMovie, collecting data and graphing using Numbers and SMART notebook, and programming concepts using Swift Playgrounds.



“Gaining STEAM” projects and descriptive feedback.

1 of 14

Gaining Steam has really been successful in bridging the gap that exists between knowing what technology is and does to knowing how to utilize technology in a productive and beneficial way. It is our goal to engage and empower individuals of all ages with technologies, resources and knowledge required to confidently exist in our advanced technological world.





Teaching

Professional Learning

The faculty at West Ferris Intermediate & Secondary School is committed to ensuring that ongoing professional learning is provided for the entire learning network. Apple provided initial training of our STEAM staff and this helped us create a solid foundation for a self-sustaining learning community.

Professional development with an emphasis on capacity building is conducted on regular basis. All members of the team routinely share newly acquired knowledge, ideas, and expertise. The two Apple Distinguished Educators at West Ferris are always

available to provide on-demand in class support for teachers that are trying to incorporate the use of new technologies into their classrooms.

This year the STEAM program helped to host and facilitate an Everyone Can Code workshop conducted by Apple at West Ferris. Teachers and administrators from across our school board descended on West Ferris to participate in one of the two workshops that were run that day.

During the application portion of each workshop we brought in several of our grade 9 and 10 STEAM students who been learning to code using Swift Playgrounds a week earlier to act as guides and mentors for the workshop attendees.

Our departments most recent efforts to promote capacity building and ongoing professional learning has been focused on

working towards getting every member of our STEAM department certified as an Apple Teacher for MacBook's, iPads, and Swift Playgrounds.



STEAM students helping to facilitate an "Everyone Can Code" workshop.



Instructional Design

The STEAM program continues its tradition of focusing on integrated cross-curricular project-based learning. Teaching and learning is not defined by what is going on in the classroom but rather, has emerged as a 24-7 experience. Delivery of the curriculum has transcended the classroom; our ability to leverage technology allows students to seamlessly work collaboratively, independently, or consult with their teachers

wherever and whenever they choose. The traditional role of the teacher in the classroom has changed from being the sole purveyor of knowledge to being an active participant in the collaborative learning process that is dominated by co-investigations, and peer support.

Our teachers have redefined their role in the classroom and adjusted their pedagogy accordingly as they are clearly now co-learners with their students, with the students often taking on learning leadership roles.

Staff and students are strongly encouraged to take risks and explore innovative project-based learning using technology. We applied this methodology to our Introduction to Computers course last year by introducing our students to the concept of coding using Spheros. Earlier this year we expanded upon our success from last year by incorporating parrot mini-drones into the mix as well. The culminating highlight of this year came after two of our STEAM teachers attended an Everyone Can Code workshop facilitated by Apple in Sudbury, Ontario, and learned about Swift Playgrounds. After attending this workshop we quickly incorporated Swift Playgrounds into our tool kit for teaching coding. We immediately recognized that the invention of Swift Playgrounds helped us to fill a void in the learning continuum between block based coding, and actually coding using Swift and Xcode. Since adding Swift Playgrounds to our instructional practices we have noticed a dramatic difference in student learning compared to previous years. Our current



students have ravenously worked through the curriculum and have greatly surpassed what was possible in previous years and they have progressed to the point that they are tackling concepts that we normally only reach in senior courses.

Curriculum design has been completely transformed. The traditional model where teachers were solely responsible for its development has evolved from to a vision where teachers and students collaborate to improve the overall teaching and learning experience for the entire educational community. This year we rolled out a new course called iCoaches. We modeled the design of this course after consulting with Rhiannon Sparkes. Rhiannon is an Apple Distinguished Educator who teaches for the Lester B. Pearson School Board in Quebec. She had been referred to us by Apple as a person who we might be interested in touching base with, as she had help to set up a similar student driven educational technology coaching program at her school, Dorset Elementary, called "iTutors".

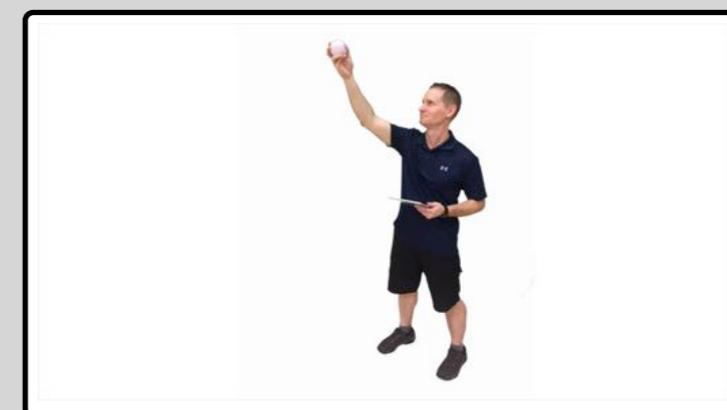
The goal of our iCoaches courses was to leverage the knowledge and expertise of our STEAM students to help both students and teachers improve their use and understanding of educational technology. Our iCoaches now act as mentors and technology experts for the entire staff and student population. They do everything, from trouble shooting computer problems, to repairing cracked MacBook or iPad screens, to collaborating with teachers on how to design lessons that incorporate the use of technology.

"As a student that is a hands-on learner, I struggle to stay focussed in most classroom settings. The STEAM program and its project-based learning model allows us to use modern computer and shop equipment to design and implement technologies with a focus on working with each other. We are free to move around, experiment and try things out!"

Jordan Miller
STEAM Student

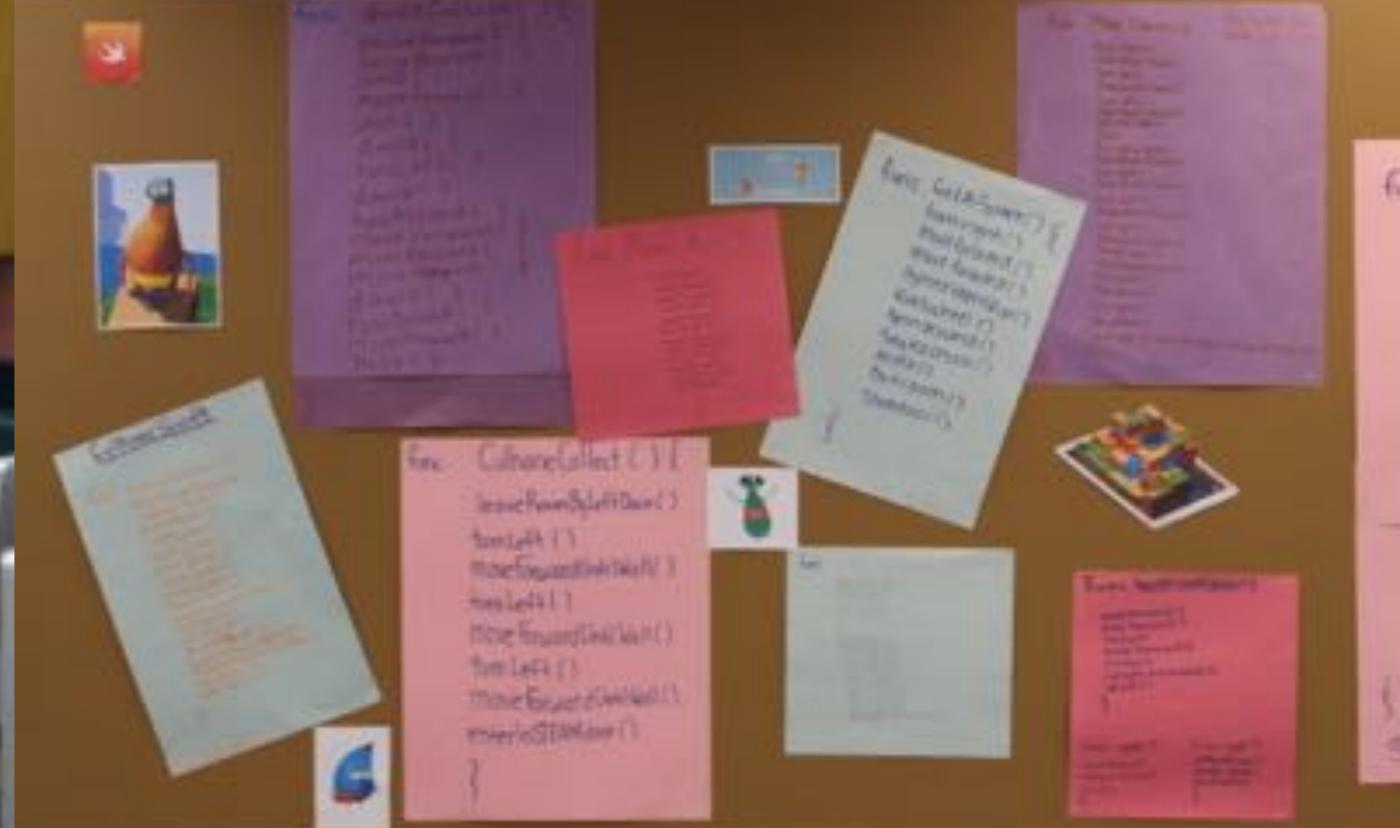
STEAM - Teacher Interviews

Brent Yacoback
STEAM Coordinator
ADE - 2015



Ryan Culhane
STEAM Teacher
ADE - 2017





Environment

Learning Spaces

Using a MacBook and an iPad in a 2:1 learning environment, students have the opportunity to collaborate with their teachers and peers using a variety of social media applications such as iMessage, and FaceTime. In addition, course materials are delivered through the D2L learning management systems offering tools such as email, discussion boards, file sharing and other collaborating tools.

Student learning in the school takes place in a variety of settings. Specialized facilities are used for collaborative inquiry such as

an iMac lab for 3D modeling and printing, a science lab for conducting experiments, a maker space environment with a wide variety of skilled trades working environments. In dedicated STEAM rooms, desks are arranged in groups so that students can continuously collaborate with each other on projects, concepts and design elements.

Infrastructure Design

To support the STEAM program, every student is assigned their own personal Apple MacBook Pro for grades 9 and 10. This ubiquitous access to technology serves as a critical component of program delivery. Also, the STEAM program now has an iPad cart dedicated to the STEAM classroom to allow students to use a wide variety of educational apps, recording tools, and

programming specific apps such as Swift Playgrounds on their journey towards app development.

All STEAM students take an Introduction to Information Technology course during their first semester, where they learn how to use their MacBook Pro, an iPad and installed software/apps. This course provides a foundation from which all the other courses will build upon. The initial skills that the students learn are continuously reinforced, and directly applied to the projects they complete in every other STEAM course.

Wireless access points have been strategically placed throughout the school to insure that robust, reliable and seamless internet access is available throughout the entire school. The Near North District School Board through its agreements with Desire To Learn, have provided the school with an easy to access and maintain Learning Management System, to which STEAM students have guaranteed access.

An IT HelpDesk is accessible by phone, or online during the regular school day hours of operation. The Near North District School Board has a certified Apple Technician that takes care of major hardware claims within our board, and he is in constant communication with Apple Professional Service technicians. Additional specialist staff who are certified with the Apple Teacher and Apple Teacher with Swift Playgrounds recognition are available to support teachers with the classroom integration of the Apple productivity suite, D2L learning management system, and other cloud-based technologies.

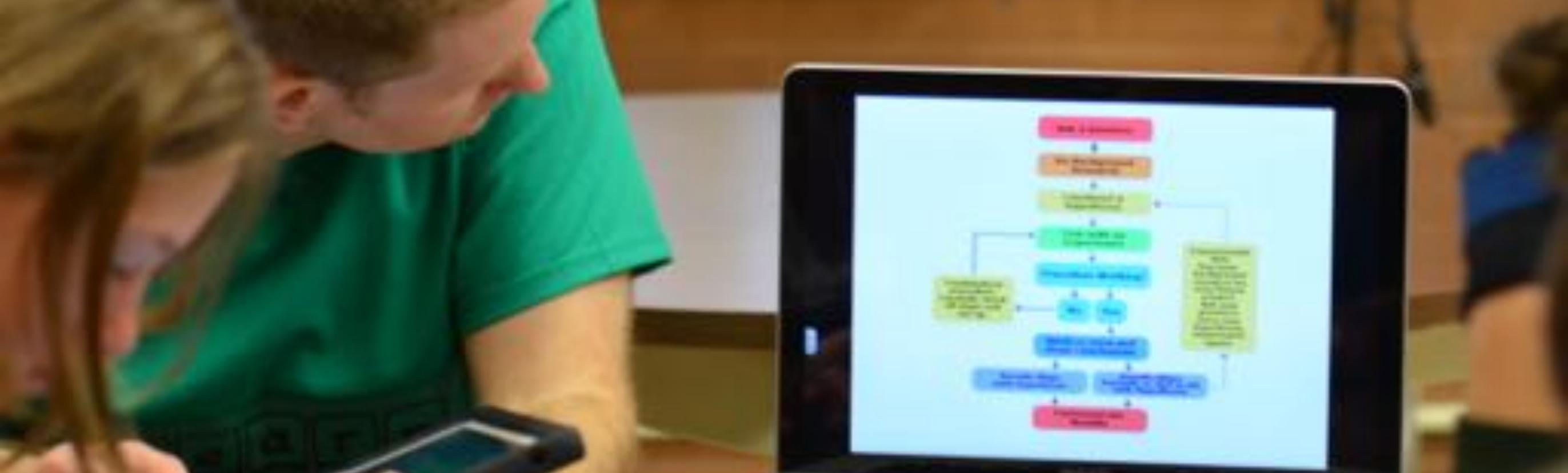
“As someone who has a learning disability, education is really hard and taking my time and working in class can sometimes be difficult. Through the STEAM program, I’ve learned a lot of new tricks with technology, time management, along with working with other students and making sure that I have all my projects in and done to the best of my ability”

Jessica Kelso
STEAM Student



Jessica Kelso displays the assistive hand she designed and assembled using the STEAM 3D printing facility.





Results

Research Practices - Quantitative

Our school administration and teaching staff have implemented a strong focus on improving EQAO standardized testing results both on the grade 9 assessment of mathematics, and the grade 10 Ontario Secondary School Literacy Test. This spotlight study as well as continued monitoring of student engagement, attendance and credit success rates have given us some clear target markers for our STEAM students.

Data collected since 2009 clearly demonstrates that STEAM students are outperforming their academic peers locally on

assessments, in addition to provincial EQAO Math and Literacy standardized assessment scores. High levels of student engagement are demonstrated by the exemplary attendance of STEAM students, and their participation in a wide range of extracurricular activities and school leadership opportunities. Staff and students reflect upon assessment results to focus learning on areas that require more improvement.

Students that have completed the STEAM program have continued to use technology throughout the rest of their high school careers. STEAM students often become the "go to" people for many of the staff and students to turn to for help with using technology in and out of the classroom. With our grade 11 and 12 iCoach courses, our STEAM students now have the opportunity to work in classrooms with teachers and other students, designing and implementing core curriculum resources.



Students cite how the program teaches them to improve their time management, self-regulation, problem solving, and critical thinking skills. The social aspects and the collaborative learning opportunities are integral parts of the student's engagement.

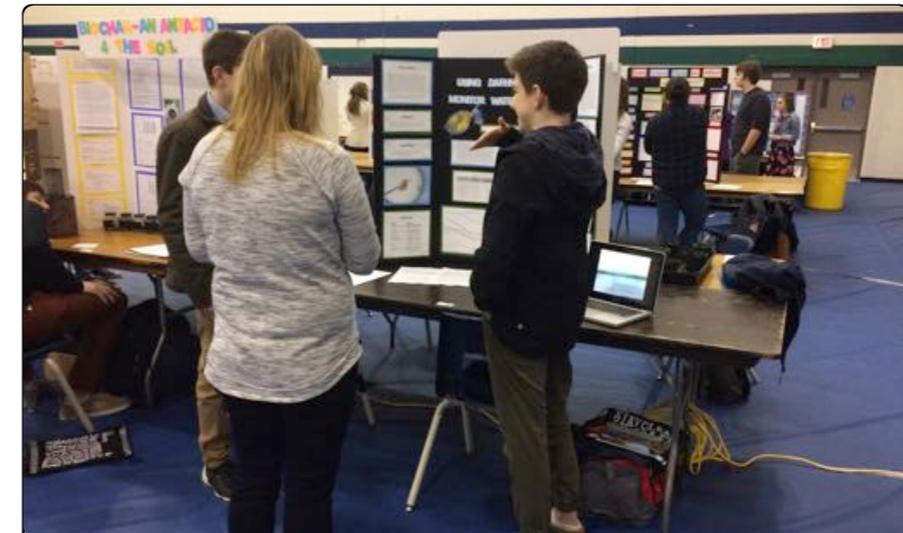
Science Fair

In addition to the quantitative and qualitative data presented here, our STEAM students regularly participate in the regional science fair. In each of the last three years, STEAM students have earned one of the top prizes in the region, and had the opportunity to represent our area, school and program and the Canada-Wide Science Fair.

Research Practices - Qualitative

One of the guiding principles of the STEAM program is to ensure that the program is meeting the needs of all learners. Feedback is encouraged from the school community and students about the program direction, overall efficacy, and future initiatives.

The STEAM program is very successful in helping its students to become better learners. Learning is a deeply personal and a highly individualized experience. When the faculty ask past and present students how the STEAM program affects their learning, the depth and variety of responses was overwhelming positive.



STEAM students and projects at the Science Fair.





Contribution & Credits

We are very grateful to all of the Near North District School Board staff, both past and present, for their vision, creativity, and perseverance in the Science and Technology program at West Ferris.



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