

Dream IT

Project Description

Creating, making, and tinkering are all verbs now at the forefront of educational technology. Researchers and educators have found the immensely positive impact on learning through building and creating as part of content learning and as an education experience. The future of tomorrow will be in the hands of problem solvers, gritty workers, and makers. As today's educators have begun to embrace these liberating and enriching learning activities into their classroom and spaces, there is a gap appearing in access to materials and trained personnel to lead students through the maker experience. Because this gap exists, students are not able to gain the skills and confidence in STEAM areas.

The opportunity for meaningful impact will come from the purchase and use of the Pro Library from littleBits. The Pro Library kit is designed to be used up to 32 students at a time. This kit provides the necessary equipment for students to invent using programming, the internet, music, and logic. The Pro Library can be implemented and accessed in the school, library, or a dedicated maker-space. Such a kit would be a tremendous asset to impact the imagination, problem-solving, and STEAM skills necessary for student success. I have already implemented an extremely scaled down version of this kit and witnessed students become immediately enamored with the creation process and gain confidence in their engineering skills after only twenty minutes of working within a small group. Bringing this learning experience to a larger group and expanding the creation possibilities will allow all students the opportunity to succeed through STEAM.

Outline

Students will be able to properly engage with a range of materials allowing them to create varying projects connected to content areas and as an engineering experience. Through using the littleBits Pro Library, students success will be seen as they work through projects they create. These experiences rely on students to think critically and apply their knowledge while they build a deeper understanding on ideas rooted in content. As a teacher of computer applications, I see the need for students to learn more about engineering and the skills required to build and program. While using littleBits, there is heavy emphasis and use programming and iterative design. Students can begin with a goal in mind or simply play and are engrossed in making process. They learn how to use circuits, magnets, and conductors to create whatever they are imagining.

Within the main content areas, students will incorporate STEAM into all fields. As students display their knowledge in content specific ideas, they add value to their work by using vastly different forms of comprehension rather than through simple multiple choice. Measuring student success and progress can be done through written and verbal explanation. Students can track

their experience from start to finish and explain how their creation represents an idea. They can create and test different phenomena and explain through using the scientific method. Mastery can be displayed as students apply their knowledge in creating items in any content area. All content areas can be enriched and students progress shown through implementing the Pro Library kit.

The most important aspect of the Pro Library lay in the kit's ability to highlight the tenets of STEAM education into all aspects of learning and assessment. The purpose of this kit is not to simply use the technology as a replacement for current practices, but to expand and enrich the educational experience. Using this equipment guarantees students will incorporate creativity, innovation, and problem-solving into any task.

Context

The school district which the littleBits Pro Library is bound for is in Clare County, the county ranks within the ten poorest counties in the state of Michigan by any major measure. The county is decidedly rural with approximately 30,000 residents and this number is expected to decline slightly. With 23% of the general population living under the poverty line and a staggering 36% of people under 18 living under the poverty line, the student population is at tremendous economic disadvantage. Students lack not only in economic wealth but in academically successful role models with a paltry 11% of the adult population holding a bachelor degree or higher. Each school within the Harrison Community School district is a Title 1 school with approximately 63% of students eligible for free or reduced lunch.

The statistics all point to the students of the district being at a significant disadvantage in regards to being academically successful. I am well aware of the struggles these students face on a daily basis as I am a product of the Harrison School district. Many of the students who do come from economically stable homes are often without a father for extended periods of time as many men are military, work across the USA on oil and gas pipelines, or are in construction. The one glimmer of hope these students have come from the education they receive from the schools. Harrison Middle School earned Reward School status for their test score improvement during the 2015-2016 school year. The teachers are enthusiastic and driven to see all students succeed.

The hardship riddled community is buying in on the success as the first school bond in over 20 years was recently passed to improve school conditions. Still, the students lack basic access to the technologies and STEAM education that will allow them to continue their success beyond the classroom. As both a seventh grade social studies teacher and middle school computer applications teacher, I must be very creative to incorporate technology within the classroom as there is only one computer lab dedicated to learning technology and only two laptop carts

available for over 300 students. This kit will provide students with experiences and knowledge that is currently unavailable within the school district and especially at home.

Content

One of the most discussed areas in educational technology is about coding and robotics. In my two years as a computer applications teacher, I have realized how important these two areas will be for student success. However, they are not stressed by state curriculum or nationally. When students arrive to me, I have introduced them to multiple coding websites and programs. This introduction is generally the first time students have even heard of the terms coding or programming, let alone actually perform any kind of programming. Robotics lags even further behind as students generally have never tinkered with electronics or built anything that is capable of performing even the simplest of tasks. Considering how little experience they have coming into a technology specific classroom, I have never witnessed or heard of students using programming or robotics in content area classes. The teachers and students in the district either are uninterested or are more likely completely oblivious of the different ways these technologies can be incorporated.

Technology

The littleBit Pro Library is best suited to address the needs of these students. This kit will provide the students learning skills necessary for 21st century learners. The electronic building block which the kit is composed of allows students to either follow already designed projects or create their own. Working within groups, students will learn collaboration and teamwork skills. Through play, students will explore their creativity and expand their imagination. Critical thinking and problem solving skills are inherently used during the design and build stages of the inventions. Using this technology also connects them to the larger littleBits building community which includes a massive user generated website and community designed for people across the world to engage in idea sharing. Through the use of this kit and the associated free products, students will be able overcome the gap in accessing materials and have easy access to a community which they can learn from while simultaneously contribute to.

Pedagogy

As students are mostly unaware or inexperienced with the “maker movement” and using this technology, there is an incredible opportunity for growth in all students. Coming together are two extremely important ingredients in learning. First, these students are all digital natives who use products which include the components within the Pro Library. The broad knowledge they already have can be built upon with learning circuitry, programming, and inventing. Constructing new meaning from their prior experiences will allow students to further their understanding and

grasp concepts they are currently unfamiliar with. Their “novice” status should not be discounted when given the opportunity to engage with these new technologies. Secondly, as I have previously mentioned, the students become completely engrossed when working with the littleBit kit. They are incredibly curious and highly motivated to play with and use the components. Their fascination is unbounded when given just a small sample. These students are quick to realize this technology is fun, challenging, and worth the effort. Using their intrinsic motivation to build and explore nearly guarantees student success under very simple parameters.

Technology, Pedagogy, and Content Knowledge

As a computer applications teacher, I see the immediate impact in using the Pro Library. Students will be able to understand the hardware and software components which make up our technology dominated world. They will be provided the opportunity to gain skills that will enrich their education, personal lives, and the lives of others. By removing the barrier to this important addition to the district, these students will grow exponentially in field of STEAM.

Within content areas, students will have the tools to create, relay information, model, and conceptualize content in completely different ways. They will no longer be bound to learning within a restricted lens. Using their skills gained from using the Pro Library will allow them invent, problem solve, and experience education in ways unseen in the district and around the state. This growth will be possible especially as content teachers become educated and aware of the possibilities specific to their subject. As I will soon acquire my degree in educational technology, I am equipped with the skills to train even the most hesitant and technology resistant educators to see the benefits which come from incorporating the Pro Library as part of their instruction.

Evaluation

The goal of integrating the littleBits Pro Library within the school district is to provide students access to STEAM skills they otherwise are incapable of learning due to lack of accessibility. The impact of implementing this technology can be measured in several ways. First, a confidence and skill survey would be provided to both teachers and students for self assessment in regards to STEAM. Over the course of the year, as both teachers and students use and are familiarized with the Pro Library, two more surveys would be given at the end of each semester. These surveys would allow for the changes in confidence and skills to be measured building or district wide. This data can then be applied within the building or district to identify areas of strength and weakness in both students and teachers. Administrators can then make policy changes

and/or provide professional development to educators as they continue to become acclimated to using the Pro Library.

Independent students and teachers could also be selected to represent the ranges of skill and confidence to be monitored during the year. Interviews conducted would cover their personal experience to provide anecdotal evidence for the inclusion of the Pro Library. The personal feedback would include specific skills developed or personal changes in perception. These interviews would also provide an opportunity in feedback for improvement, suggestions for differentiation, and general questions. Also, as personal testimonies are given, the school or district would be able to publish the positive impacts on the learning culture. A kit of this size is difficult to find in districts and would be a point of pride to show how the school system is utilizing such a transformative technology.

Yet another way to observe the impact of the Pro Library would be to see how the kit was being implemented throughout the school. The computer application classes would be able to demonstrate their technology specific learning through inventions and subsequent reflections. Varying projects would be given and graded based on rubrics. Students will show their understanding through their projects and with a conversation or written components concentrated on how their creations reflect their skills in STEAM. As student progress over the years, a catalogue of their work can be completed to display the achievements and associated skills acquired.

Within content area classes, students will incorporate the materials in the Pro Library into their projects, essays, and other relevant assignments to demonstrate a deeper understanding of the content knowledge. With the use of rubrics or other grading systems, content teachers will be able to assess for the intended learning outcome along with the inclusion of technology. Student will have an opportunity to elucidate how their application of STEAM components enhanced their learning and acquisition of the predetermined learning target. Further evaluation can be developed by teaching teams or individual to be given in each content area as seen fit by teachers.

Issues Addressed

With any change, there is bound to be resistance or apathy. Educators and administrators are not the most easily convinced people. Convincing hesitant or resistant staff will be paramount to the success of introducing and continually applying such a new and potentially overwhelming project. Since the vast majority of teachers are not digital natives in the district, they may be apprehensive about the inclusion of the Pro Library or unable to perceive the benefits of such a tool. Envisioning how the kit will be used outside of the context of a computer lab and as part of their content will be especially challenging. I believe the greatest way to address this

apprehension is to simply allow the all parties to play with the kit in a stress free environment. Using Legos and K'nex was the closest experience I with anything similar to the littleBits kit I personally purchased and used. I had no idea what to do or how to use my kit when I bought it. I believe my colleagues will be in a similar situation. However, they all have some experience building and creating with blocks, Lincoln Logs, or erector sets. Drawing on these parallels will help as the adults create and use their imagination in the build process. During this experience, I will highlight how they are participating in STEAM and they are makers. Removing the fear and anxiety of new technology while connecting to the use in the classroom will give confidence to each teacher. Lastly, I will highlight and stress the importance of our students being able to access this technology with educators who understand and believe in the importance of STEAM. They will become the role models students need while learning 21st century skills.

In Conclusion

The setting is perfect for the littleBits Pro Library to become part of the Harrison Community School district. The need for students to learn STEAM skills has never been more necessary than now. This student population has the most to benefit from including this technology in their learning and the most to lose if there is no change. As an educator who has already piloted a version of littleBits within my classroom, I can guarantee an immediately positive impact on all students who access such a transformative technology. I have the skills to implement the Pro Library within the district and the training which will allow me to mentor other teachers. The success of this project relies simply on attaining the littleBits Pro Library.