TEF Grant Final Report

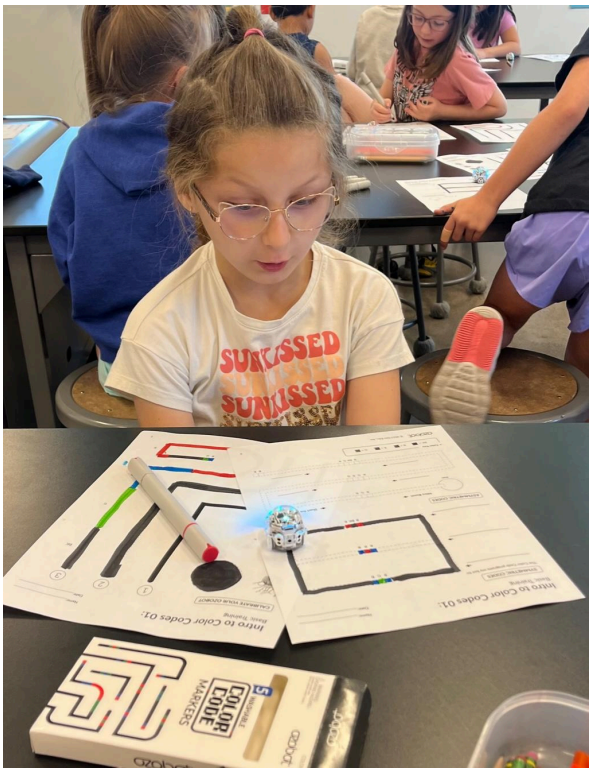
Name: Jennifer Marlowe
School: New Vision Charter School
Grant Type: Great Idea Grant
Project Name: Tiny Robots, Big Possibilities!

Objective of project as stated in the grant application:

One of our goals in the K-4 STEM Lab at New Vision Charter School is to expose our youngest students to a wide range of materials and challenges related to STEM disciplines. Giving our littlest learners the opportunity to work with robots in hands on, engaging activities shows them that computer science is an attainable skill for everyone and shouldn't be intimidating. We are requesting a class set of 14 Ozobot Evo robots, along with supporting magnetic coding mats and supplemental tiles. Ozobots are tiny robots that offer increasingly difficult coding challenges as students advance their computer science skills. Initial lessons in Kindergarten and 1st grade will focus on working in pairs to create a color coded path that Ozobot can read with a built in sensor. This type of "unplugged" computer programming teaches coding skills to our youngest learners without having students staring at a computer screen for long amounts of time. 2nd and 3rd grade students will utilize Blockly coding to build programs that will direct Ozobot's actions in several different interdisciplinary activities. Finally, 4th grade will have the opportunity to explore higher level Python coding with Ozobot. The versatility of Ozobot Evo's computer programming methods will allow all grades to participate in this project at academically appropriate levels.

Project Implementation

Thanks to the Thompson Education Foundation Great Idea Grant, New Vision Charter School received a class set of Ozobot Evo robots in February. Fourth grade students were immediately introduced to Ozobot through hands-on exploration. A series of five lessons downloaded from the Ozobot website took our engineers through handling Ozobot safely, identifying the functional sensors, lights and hardware on the robot, calibrating Ozobot's color and line following sensors, creating solid line paths, using sequences of colored codes to direct Ozobot's actions, and troubleshooting problems when Ozobot acted unexpectedly. Feedback collected at the end of the unit helped to implement the same lessons to second and third grade students in the following weeks. By the end of the school year, over 300 hundred students had learned to code our new robots and declared Ozobot one of their favorite experiences of the year!



Project Results

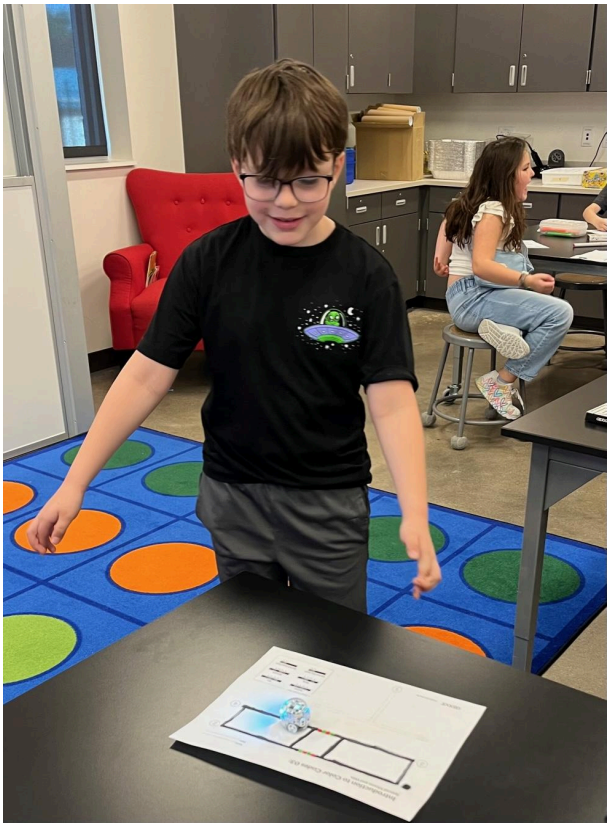
As outlined in the project proposal, student success was measured on a "task not ask" basis. Each lesson began with direct instruction of the objective followed by modeling by the instructor using Ozobot. Then students were allowed to attempt the lesson challenge on their own using Ozobot Evo in groups of 2. One of our main goals in the New Vision Charter School STEM Lab is to allow students to solve problems through critical thinking rather than directly showing most efficient solutions. Watching students recalibrate Ozobot or change the color coded path to complete the challenges showed mastery of the objectives and clear understanding of Ozobot's capabilities. If students were frustrated or struggling, asking leading questions to guide them through troubleshooting aided in success. The most rewarding part of monitoring student success was seeing the absolute joy and excitement students had watching Ozobot carry out correctly coded pathways!

Allowing students time to become familiar with Ozobot's basic functions was an unexpected challenge. The original proposal discussed Ozobot's ability to grow with our K-4 students; starting with unplugged coding for Kindergarteners and 1st graders, moving to OzoBlockly coding for 2nd and 3rd graders, and ending with Python coding for 4th graders. It was discovered that students need a basic knowledge of how Ozobot functions before introducing OzoBlockly and Python coding to higher grade levels. Building basic knowledge took more time than anticipated and prevented diving into more complex coding in the few months left before the end of the school year. Implementation of different coding objectives using Ozobot for each grade level every year will ensure that students build upon previous knowledge and continue to gain computer programming skills every year. Next school year, rising 3rd and 4th graders will be able to move on from basic robot operation to coding Ozobot from a computer using OzoBlockly!

Unexpected Outcomes

It was a surprise how attached students became to their Ozobots! While it was anticipated that our young engineers would enjoy working with such tiny robots capable of so much, it was entertaining to see them name their robots and talk about their robots' personalities. Coding Ozobot to walk backward inspired, "He's moonwalking! Our robot is Michael Jackson!" One team decided their robot was a video game character named Steve and turned a series of simple coded commands into an elaborate story of beating a game level. These connections to literacy and relevant pop culture further showed how useful Ozobot will be in designing engaging lessons for our kids while maintaining a high level of learning.

Another surprising outcome was Ozobot's ability to inspire creativity. Coding and computer engineering are often labeled as highly analytical fields and can be intimidating to young learners. It was discovered that giving students the last 10 minutes of class to use their imaginations and create their own paths using the color codes they had learned led to the most excitement. Showing that complicated technology can be accessible and fun may be the greatest lesson our young engineers learn. One of our main goals for our students is for them to leave the K-4 STEM Lab after 5 years feeling like science and technology is familiar, fun and accessible to learners of all levels.



Grant Final Budget

See attached documents. Please note, in alignment with the initial budget request, the Self Service PD Bundle ($249) was funded by New Vision Charter School.

Replicating Tiny Robots, Big Possibilities Throughout TSD

I feel Ozobots could be easily introduced to any elementary classroom with a minimal amount of teacher prep. Ozobot provides dozens of complete online lessons to get classes started. After students learn how to operate Ozobot, the possibilities are endless. Ozobot could easily be integrated into most classroom curriculums with a small amount of effort. The best part is kids get excited to use these robots and don't realize they are learning content at the same time!

One thing I learned that definitely affected how I use Ozobots in the classroom is they only have a 1 hour battery life. I don't believe this would pose a challenge for a grade leveled classroom teacher using Ozobots to supplement a class lesson, but it does provide a challenge for specialist teachers, who typically see many different classes and grades throughout a single day. I learned that I can only use a class set of Ozobots with a single grade level at a time, before having to charge them for up to 2 hours. For this reason, it worked best to present an Ozobot unit on a rotating schedule, working with only one grade level at a time for a period of weeks and then switching to another grade level.

Final Comments

On behalf of the Kindergarten through 4th grade students at New Vision Charter School, I would like to thank the Thompson Education Foundation for their generous support through the Great Idea Grant. NVCS is committed to continuing to provide exceptional educational experiences to our students, and it wouldn't be possible without support from our community. The members of the TEF board are always welcome to stop by the NVCS K-4 STEM Lab and see firsthand how your contributions make a huge difference in our students' education!