

# Optimizing Resources- Anecdotes from Hilltop Elementary School

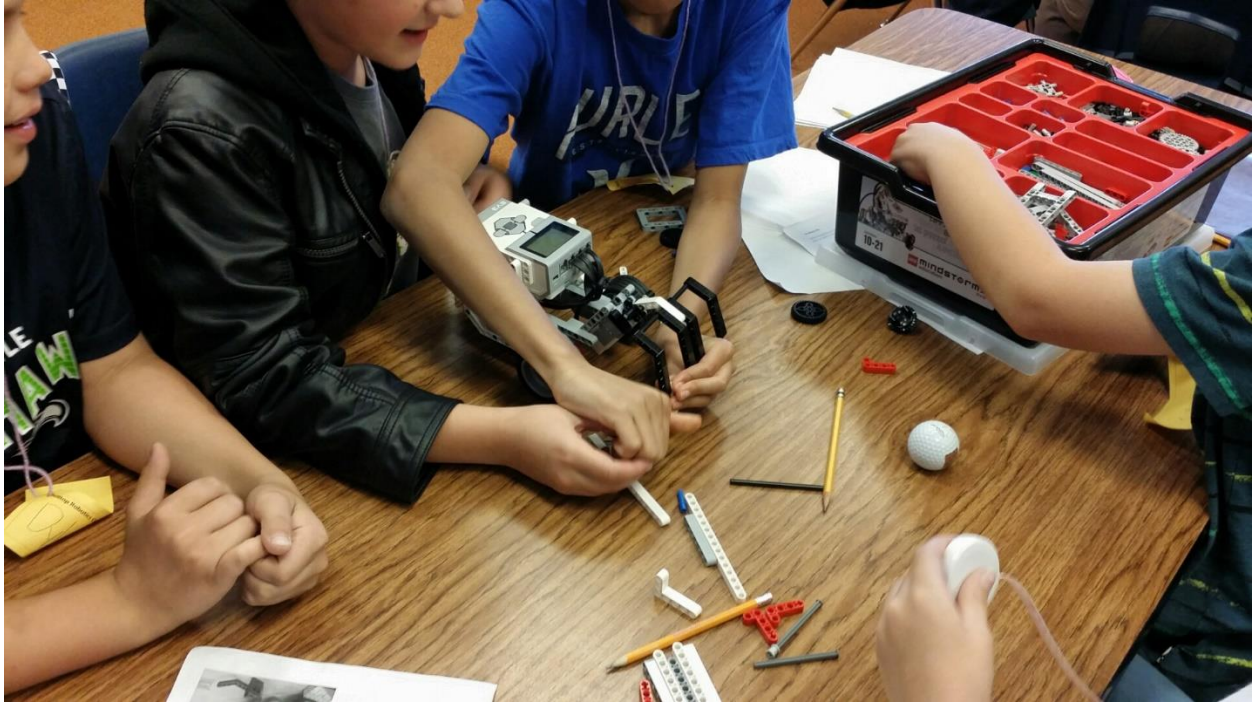
Students and teachers at Hilltop Elementary expressed interest in doing Lego robotics and we were eager to look more closely at the use of robotics in elementary school settings so we teamed up together. We worked with them to design an afterschool program that could accommodate up to 15 students. The kits we utilized were five Lego Mindstorms EV3, which put three students per kit, and the curriculum was a modified version of one designed for the NXT from [Geek Mom Projects](#). With this, we were able to co-teach an afterschool program that ran for nine 1-hour sessions. We have partnered with Hilltop over several academic quarters now and has been neat to see how the robotics program has evolved over that time. Through our partnership we have learned a few valuable lessons about balancing resources that we'd like to share.

## How do we get engaged with limited resources?

This is a case-by-case solution that needs to be assessed with the resources that a school has available. We have found being mindful of the end-student experience is really an important element to keep in mind and one that is easily lost. Limited resources require careful group distribution. At Hilltop, since we could afford to do five sets, we wanted to keep the overall club size small so that all kids could have hands-on experience. Sometimes there is a tendency to want to include as many students as possible even if the individual experience gets diminished. We think it is really vital to think about ways to preserve the individual experience while still allowing for student access. Sometimes that means breaking into smaller groups and rotating through different stations so that kids really can get that super important hands-on time.

Hands-on experience aside, there is also the role of the adults in the room to consider with regard to the overall student experience. With five sets, we were able to get by with only one or two adults in the room at a time and the students were tech savvy enough to help each other when needed. We also found that high school students from the local robotics team were also eager and willing to volunteer their time to assist the elementary robotics program, another way to extend the educational experience for both the younger kids and the high schoolers.

In circumstances where not as many sets are available or class size is too large, we have found it very effective to make robotics a center or an activity that students rotate through. There are certainly many other robotics kits and sets that kids can play and learn with that are less expensive and equally as engaging. Not having a full class set is not a problem if there are many interesting hands-on opportunities for students to build and explore. In fact, not all robotics tools resonate with all students so having some different options might not be a bad thing and may allow them to specialize or dive more deeply into one that really resonates with them.



## Cost

The [Lego Mindstorms](#) sets are heavily centered around getting your hands on both the hardware and software. The greatest problem with that is the cost of the kit per student. At \$379.95 (+tax), one can see why most schools would be tempted to put as many kids as possible on a set. However, one thing to be especially cautious about is that the larger the group size the more empty hands and the more unsatisfied students. Most of our groups operated with three students and had little trouble, but there were always some creative differences when it came to the physical building of the blocks and it's challenging to have two students on a computer. Helping students identify different roles within the team and rotating through various roles can help increase the accessibility of the overall experience.

## Time

With approximately 55 minutes (afterschool when all the students had lost a significant amount of charisma), our deficit was time. If possible, extending a program to 90 minutes or (with the potential for a snack break) could be helpful. We found that when students are coming in immediately afterschool with no transition time or break to help them shift gears, their attention is usually already spent and this 55-minute session starts to feel more like 30 minutes. These students need time to prime themselves for their lesson. They need time to remember where they left off. They need time to talk to their teammates. And finally, when they're all on the same page and ready to start, their time is nearly over! If possible, having a bit more literal wiggle room in an afterschool robotics program for elementary students will allow for beneficial time for explanations, setup, and experimentation.



## People

The presence of an enthusiastic robotics instructor who is willing to have some flexibility with the elementary aged student is by far the greatest asset in garnering student interest and building student confidence. Having worked with several self-proclaimed “non-technologists,” I can assure you that anyone can learn to use Lego Mindstorms (and teach it too, but that’s a story for another post). I cannot stress enough how important it is to be present and energetic. In our case, we were lucky to have local high school students volunteer a few afternoons to help increase the “fun” aspect for the students. So, for a few days each elementary school student group had their own high school mentor, which was really inspiring and special for the elementary students. It doesn’t hurt to ask your local high school robotics club if they’d like to support an elementary school group!

And, like we often say to adults we work with in technology programs, kids typically know more about the latest things than we, as adults, do. That is nothing to feel threatened by, but is a tremendous opportunity for a more democratic learning environment where kids feel empowered to share their knowledge and assume leadership roles within the group. “Let’s learn Lego robotics together” is a far better mantra than “Let’s not do it at all because I’m not perfect at it!” Finding ways to help students play and engage with robotics at an early age is a terrific way to help them think and problem solve while engaging their imaginations.

## Reevaluate Your Resources

Every program will have different deficits and different solutions. We don’t believe there is a “magic bullet” to running a successful program. But, with an open mind, a willingness to think creatively within the environment that you’re in, and an analysis of your available/potential resources, you can solve your problem... and isn’t that what robotics is all about?