



# THE VALUE OF SERVICE LEARNING PBL'S

Project-based Learning Allows Students to Learn With a Mission.

*Editor's note: This is the first in a year-long series featuring Penn-Harris-Madison School Corporation.*

Penn High School Robotics & Advanced Sculpture students pose for a picture of the finished Hulk Magic Wheelchair before it's revealed to the Cantu family.



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Service learning is not a new concept. It's been incorporated into practicum experiences at the higher education level for decades. Why? Because it provides opportunities for students to become actively involved in their communities through volunteerism. Students who participate in community-based learning programs mature into responsible global citizens. Whenever you can take lessons outside the classroom setting, students become more engaged. This is project-based learning. The hope is that hands-on experiences help students uncover their passions, and that the discovery process starts them on their journey of determining a career path. So what happens when you combine service learning with project-based learning? You get "learning with a mission!" Students gain invaluable, real-world experiences that have true purpose and provide meaningful benefits to others besides the students.

Project-based learning as defined by the Buck Institute for

Education is “a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge.”

The “Gold Standard PBL” as defined by Buck Institute for Education are projects “focused on students’ acquiring key knowledge, understanding, and success skills.” They identify seven project-based teaching practices:

1. **DESIGN & PLAN:** Teachers create or adapt a project for their context and students, and plan its implementation from launch to culmination while allowing for some degree of student voice and choice.
2. **ALIGN TO STANDARDS:** Teachers use standards to plan the project and make sure it addresses key knowledge and understanding from subject areas to be included.
3. **BUILD THE CULTURE:** Teachers explicitly and implicitly promote student independence and growth, open-ended inquiry, team spirit, and attention to quality.
4. **MANAGE ACTIVITIES:** Teachers work with students to organize tasks and schedules, set checkpoints and deadlines, find and use resources, create products and make them public.
5. **SCAFFOLD STUDENT LEARNING:** Teachers employ a variety of lessons, tools, and instructional strategies to support all students in reaching project goals.
6. **ASSESS STUDENT LEARNING:** Teachers use formative and summative assessments of knowledge, understanding, and success skills, and include self and peer assessment of team and individual work.
7. **ENGAGE & COACH:** Teachers engage in learning and creating alongside students, and identify when they need skill-building, redirection, encouragement, and celebration.”

(“WHAT: Gold Standard PBL: Project Based Teaching Practices.” *PBLWorks*, Buck Institute for Education, [pblworks.org/what-is-pbl/gold-standard-teaching-practices](http://pblworks.org/what-is-pbl/gold-standard-teaching-practices).)

When looking over Buck Institute for Education’s seven best practices for PBL teaching methods, it becomes evident how adding a service component to PBLs also adds depth to the student experience and outcomes. Students work to do more than just solve a problem for a grade; they work to find a solution that provides valuable assistance to someone else. At Penn-Harris-Madison, we have seen the value of adding the extra layer of learning with a mission to PBLs, particularly at our high

Right: Penn Robotics students making plastic molds as part of “Engineering Ella” project.

school. The block scheduling at Penn High School lends itself to students and teachers being able to spend several weeks, or an entire semester in some cases, to work on a service PBL.

Jim Langfeldt, Penn STEM Academy Teacher and sponsor of Penn’s Robotics Team 135, has been implementing the learning with a mission concept for quite some time. Every school year for approximately five years, a group of Langfeldt’s students use assistive technology to benefit a child with a disability. The students work over an extended period of time to design, build and provide custom assistive technology devices ... free of charge! These projects have now fallen under the “Mission to Engineer” umbrella:

- ▶ 2018-19: **“Innovations for Isaiah.”** Isaiah, a 4th grader at P-H-M’s Moran Elementary, had Arthrogryposis Multiplex Congenita, making his joints less flexible. Students worked on modifying a scooter for Isaiah to use in gym class. They also built a device to help him with the daily task of putting on his socks.
- ▶ 2017-18: **“Engineering Ella.”** Ella had Spinal Muscular Atrophy (SMA) Type 1, a disease resulting in a lack of motor neurons in her muscles, leaving her paralyzed and unable to speak. Team 135 students reprogrammed her wheelchair, designed and built hand stabilizers using plaster molds, and created an alert system for when her feeding tube overflowed.



► 2015-16: **“Voice for Braylen.”** Braylen, a kindergartner from P-H-M’s Elsie Rogers Elementary, had Joubert Syndrome, affecting his balance and coordination. Braylen had received a tablet to help him speak, but the device weighed 2.4 pounds and was just too heavy for Braylen to carry. Penn’s all-girls Intro to Engineering Design (IED) class worked on the initial design for a stand-on-wheels to hold Braylen’s tablet. Robotics Team 135 members helped out with the building of the final version of the stand, which made it easier for Braylen to take the tablet with him throughout the school day.

► 2014-15: **“Hand of Grace.”** Grace, a student at P-H-M’s Madison Elementary, was born without the lower half of her right arm. This was Penn’s first service PBL, launching the “Mission to Engineer” concept. Underclassmen Design students came up with the initial design, and Robotics Team members perfected the final design using Penn’s STEM Academy 3D printers to print a prosthetic arm for Grace. A muscle sensor, motors and specialized coding were added afterward to automate the arm. The student-built prosthesis allowed Grace to actually use the hand to pick up tiny objects and tickle her little sister.

“Since I’ve started teaching, I’ve always found that giving students a reason and a passion to be in class and to work hard at things is important,” said Langfeldt in a 2016 article for Penn High School’s website about the “Voice of Braylen” project. “When we connect things we’re learning in class to the real world, it makes everything that much more exciting.”

(Parker, Kennedy. “All-Girls IED Class Creating a ‘Voice for Braylen’: Penn High School.” *All-Girls IED Class Creating a “Voice for Braylen”* | Penn High School, 18 Mar. 2016, phmschools.org/all-girls-ied-class-creating-voice-braylen.)

In September 2019, Langfeldt’s Automation and Robotics class joined forces with students from Beth Loth’s Advanced Sculpture class to design, build and animate an oversized wheelchair Halloween costume for a boy with cerebral palsy. Joe O’Reilly, a local volunteer from the national charitable organization Magic Wheelchair, proposed the idea to Penn Assistant Principal Josiah Parker. The opportunity to do another interdisciplinary service learning PBL was one that couldn’t be passed up! Penn’s previous PBL involving multiple disciplines was the “Hands of Grace” project. On that project, students from the high school’s internal “news channel” produced a short documentary about the Robotics students’ creation of the prosthetic hand. FACS students also designed a dress Grace wore to the “movie premier.”



Top to bottom: Penn Robotics teacher Jim Langfeldt working with a student; CBS cameraman shoots video of Penn Robotics student working on the wheelchair costume.

The Magic Wheelchair project was a perfect fit for Penn’s service-oriented PBL model. Magic Wheelchair describes itself as “a nonprofit organization that builds epic costumes for kiddos in wheelchairs – at no cost to families.” Their website states that their “mission is to bring communities together to create unforgettable moments for children around the world by transforming their wheelchairs into magic!”

(“Magic Wheelchair.” Magic Wheelchair, magicwheelchair.org)

Four-year-old Zephan Cantu, from neighboring Elkhart, loves superheroes, but his absolute favorite was the Incredible Hulk. Zephan’s parents wanted nothing more than for their son to



Penn Robotics teacher Jim Langfeldt working with a student.

have a memorable trick-or-treating experience at Halloween. So, they submitted a request to Magic Wheelchair to have Zephan's wheelchair transformed into an Incredible Hulk Smash truck/machine, modeled after his favorite toy.

O'Reilly knew of Penn's "Mission to Engineer" enterprises and had briefly worked with students on the "Engineering Ella" project, so it was natural for him to reach out to Penn High School to enlist the skills and the help of our students. He also identified community businesses that would partner on this project: A Rosie Place for Children (non-profit organization/home in South Bend that provides respite care for medically fragile children) and Premier Arts (the resident theatre group of the Lerner Performing Arts Center).

This would be a massive undertaking, and the students would have to get it done in just six weeks in time for Halloween! The deadline was Oct. 19, the date the costume would be revealed to Zephan and his family at a Halloween Open House event at A Rosie Place.

O'Reilly outlined the "must haves" for the costume design. It had to be lightweight, easy for Zephan's parents to assemble, and the electronics had to be easy for Zephan to use. The first step was for Loth and her students to sketch out the giant Hulk Smash Machine design. They used

the sketches as patterns to cut out pieces (much like sewing patterns) that would be assembled into the machine. Meanwhile Langfeldt's students were working on the electronics that would bring the costume to "life" with lights, sound effects, and a slamming motion of the arms.

Students had to evaluate, problem-solve, and adjust their design throughout the building process, always keeping Zephan and his condition at the forefront. With Zephan's disability it would be hard for him to operate multiple controls, so the robotics students designed all the automation and noises to come from the push of just one single, big button. Because the costume had to be lightweight and easy to assemble, the art students had to sculpt the pieces from foam--a medium they had never used before.

As the work progressed and it was time to put the costume together, the classes were able to hand over their portion to the next class because Loth and Langfeldt's classes met on the same day one period right after the other. Identifying and setting milestone deadlines, project management, and organization were critical to the project's success. Because O'Reilly had also enlisted the expertise of Premier Arts to do the professional painting of the costume, students needed to have the wheelchair costume nearly completed by Oct. 11. Loth and Langfeldt were employing every aspect of the Buck Institute's seven "Gold Standard PBL" teaching practices to meet this deadline.

("WHAT: Gold Standard PBL: Project Based Teaching Practices." *PBLWorks*, Buck Institute for Education, [pblworks.org/what-is-pbl/gold-standard-taching-practices](http://pblworks.org/what-is-pbl/gold-standard-taching-practices).)

As excitement built around this project, we invited the local South Bend media to visit Penn High School during the Sculpture and Robotics class periods. This project had all the aspects of a great "feel good" story. The story was so well



Penn Senior Robotics student David Simonetti with Zephan Cantu in his new Hulk Wheelchair costume.



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received that “CBS Evening News” picked it up from the South Bend CBS affiliate WSBT-TV. CBS sent a national correspondent and camera crew to Penn to document the student’s assembly day on Oct. 17 and the costume unveiling party on Oct. 19.

The true magic of Penn’s Magic Wheelchair story came when the students, O’Reilly, and Premier Arts revealed the costume to Zephan in a “superhero studded event” at A Rosie Place. It was reminiscent of a red-carpet event complete with cameras, media and fans (Zephan’s family and friends). At the moment the costume was finally revealed, there was delight and excitement in Zephan’s eyes and tears in the eyes of his parents and everyone in the room.

The story about Penn High School’s super “INCREDIBLE” interdisciplinary six-week service learning PBL to help make the superhero dreams of a 4-year-old boy with cerebral palsy come true aired on Oct. 21, to a national audience on “CBS Evening News.”

It’s a story that has not only made the difference for Zephan and his parents, but has literally touched millions. To date the story has reached more than 17.2 million people! Zephan’s Magic Wheelchair reached this astounding audience number thanks to the combined

promotion of the story on Penn and P-H-M’s social media; coverage on national network news, regional and local news; but most notably because of the unexpected “shout out” to @PHMSchools on Oct. 24 from Marvel movie actor Mark Ruffalo (who played the Incredible Hulk in the Avenger movie series) on Twitter, Instagram and Facebook. The thousands of retweets from Marvel fans also included retweets from actor William Shatner and actress Patricia Arquette.

(Ruffalo, Mark. “What an INCREDIBLE Thing the Students at @Phmschools Created for a Superhero in Their Community Pic.twitter.com/yaxNif2SLm.” Twitter, Twitter, 24 Oct. 2019, <https://twitter.com/MarkRuffalo/status/1187360891567853568>.)

The story has also been shared on multiple websites, including CNN and MSN.

Reflecting on all the attention the story has garnered, O’Reilly said in an email to the group at the conclusion of the project

“... And all of this surreal publicity for our high school students, Zephan and his family, and all our community partners, started with our documentation of the student project in a series of videos that we released on social media. We know when we found about this project how fantastic it was going to be to capture because it demonstrated so clearly everything Penn-Harris-Madison School Corporation is about: Academic Excellence, Excellence Happens Here, #PHMExcellence. We know it was a great example of how our teachers look for tangible learning opportunities for students

to take what they’ve learned in the classroom and put it to good use by helping others in the community. We just had no idea that everyone would love this story as much as we do! ... I hope the students that worked on this carry this with them for the rest of their lives, that the simple act of kindness can have such an impact on a family and the world. Their involvement in this project demonstrated the mission of Magic Wheelchair and A Rosie Place which is that of total inclusion and love for our neighbors, classmates, family and friends who are disabled or medically fragile and ultimately makes the world a better place.”

The goal of project-based

learning is to equip students with work readiness skills. But even if the students who participated in this project don’t become robotic engineers or sculpture artists, they will forever carry with them the soft skills they developed along the way working on this project: leadership, teamwork, communication skills, work ethic, adaptability, interpersonal skills, but most importantly empathy and compassion. That’s the desired outcome of service learning PBLs. They provide opportunities for students to engage in the community, providing them real-life experiences outside the classroom setting.

Loth captured the essence of the project stating, “This was a wonderful lesson in showing empathy and making a difference in the community. I am sure this experience will influence [students’] decisions in the future. This is a once-in-a-lifetime learning experience!” 🌟



“Hulk” actor Mark Ruffalo’s Tweet from Oct. 24