Grades 6-12

PROJECT INVENT

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Project Invent uses design thinking to empower students with future-ready mindsets and STEM skills to become creative problem-solvers.

OVERVIEW

Project Invent engages students in real-world problem-solving by creating transformative learning opportunities. The program leverages project-based learning incorporating design thinking, engineering, and social impact. In their projects, students identify and address pressing issues in local or global contexts and then use the design thinking process to invent solutions. Design thinking is a problem-solving methodology that emphasizes empathy, creativity, and collaboration and is used by designers, engineers, and entrepreneurs.

The ultimate goal of Project Invent is for students to create meaningful projects that have the potential to improve the lives of individuals, enhance communities, and address pressing global challenges. This goal is based on Project Invent's effort to democratize changemaking because it believes that every student can invent, engineer, and make a difference. This belief empowers students to learn the problem-solving skills and innovation mindsets needed to be effective agents of change. It also empowers them to take ownership of their learning and find purpose in it.

Through Project Invent, students from diverse backgrounds become proactive, socially responsible citizens who are better prepared for the workforce and the future. In 2022–2023, Project Invent worked with 890 students from 23 states. Of those students, 83% were from a Title 1 school. As it continues to train educators and share its resources, Project Invent seeks to inspire and support a generation of fearless, compassionate problem-solvers. ▸ The Invention Journey 📑Project Invent

What Makes This Model Innovative?

Active Self-Direction

Project Invent empowers students with opportunities to work on projects in which they have ownership and practice independent decision-making skills while navigating challenges.

Relevance

By focusing on empathy as a core component of real-world problem-solving, Project Invent enhances relevance by connecting students directly to people facing the issues being addressed in their projects.

Social Consciousness & Action

Project Invent fosters a sense of social responsibility and awareness in students by having them solve problems that give them a clear sense of how they can positively contribute to the world.

DESIGN

Goals

Project Invent prepares students to be well-versed problem-solvers with a sense of social responsibility. Project Invent supports and scales its goals by working with teachers who create learning environments where they themselves are empathetic co-learners. In these spaces, failure is okay because students are encouraged to take control of their exploration of topics and they are pushed to work at the next level. 📑Teacher Practices Student Mindsets

Transformative Mindsets	Students develop positive attitudes about their ability to effect change in the world because they have gained 6 mindsets: resilience, ambition, curiosity, agency, creative confidence, and empathy.
21st Century Skills	Students engage in iterative problem-solving to learn and practice how to think critically, communicate effectively, apply creativity, and collaborate successfully.
Design Thinking	Students know how to use design thinking, a creative and iterative human-centered process, as an approach to complex problem-solving.

Experience

Project Invent immerses students in a transformative journey where design, technology, and invention empower them as problem-solvers. Using the design thinking process, students work to solve real-world problems with a toolkit that includes key design thinking methods. Design thinking is used by organizations and companies like Apple, Google, Nike, and Stanford University to add human context and creativity to their problem-solving. To make projects more relevant and inventive, students must use microcontroller technology, which helps them understand how engineering and coding can enhance their problem-solving skills.

The vehicle for student problem-solving is project-based learning (PBL) and the focus is a community or global issue. Student projects are always collaborative small group efforts. This hones their ability to work in teams, plan tasks, set deadlines, and assign responsibilities. Students also develop their communication skills as they negotiate different perspectives, evaluate ideas, and adapt to challenges. By working together through all phases of the design thinking process, students develop a sense of community along with the skills they need to make effective contributions. ▸ Project Invent – A Team's Journey

All of this is facilitated by teachers who are trained by Project Invent to equip students with tools from the world of technology, innovation, and entrepreneurship, so they can engage in meaningful problem-solving. 🖥️ Project Invent Curriculum

Empathize and Define

Students begin their projects by working through two phases of the design thinking process: empathize and define.

Students conduct interviews directly with the people affected by a problem to understand their needs and insights. The stories that come out of these empathy interviews provide a real and concrete human context that informs the potential direction of projects. Students use this context to create problem statements that help them define the challenges within a particular problem,so there is a more specific and compelling focus in their projects—a problem they cannot refuse to solve. This also helps them identify actionable insights that define how they should move forward in their efforts. ▸ Alumni Advice: Empathy & Community Partnerships

Students also generate empathy and definition through research beyond the interviews they conduct. This may include interaction with mentors and experts who can guide them through their project development process. Later in the process, these mentors and experts can offer insights, feedback, and expertise to help refine projects. This approach to problem-solving, supported by experts, enables students to engage in more innovative solution finding that is defined by real-world perspectives.

Synthesize and Ideate

In the next phase of their projects, students synthesize the information and insights they have generated into a question to focus their projects. These questions are often structured using the stem “how might we _____?” They should also help students think about their problem from different perspectives. For example, the question “How might we help football teams detect early signs of concussion?” offers a different and more specific focus than “How might we prevent concussions in football?” or “How might we make football a safer sport?” Once a specific question is developed, students use it to brainstorm solutions.

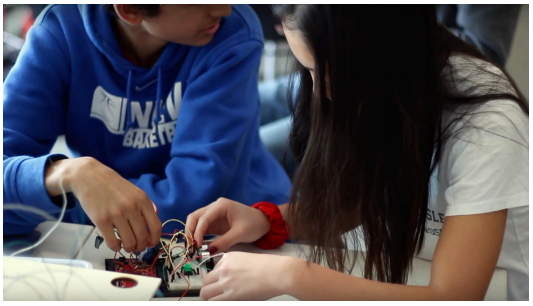
In the ideation phase of design thinking, the goal is for students to brainstorm creative ideas that may lead to a solution for the problem they have identified. This phase empowers students to explore a wide range of ideas and encourages divergent thinking for innovation. Students are challenged to adopt a counterintuitive approach to ideation by choosing quantity over quality and considering extremes in their imagination. As they grow comfortable with the process, students gain more confidence in their creativity and their sense of agency increases.

As students ideate, they are also encouraged to adopt the spirit of an entrepreneur and think about the potential scale of the solutions they are considering. This focus on impact adds another dimension of real-world problem-solving to the student learning experience. Thinking about how a solution affects greater numbers of people helps students understand some of the complexities of social change.

At the end of this phase, students work together to choose one promising idea to prototype and build out as a solution. Students pitch their idea at an "Idea Review" and receive feedback from industry volunteers, including engineers, product designers, and entrepreneurs at top tech companies. With this additional insight in hand, students work with their teammates to build their prototypes.

Prototype and Build

To make their ideas a reality, the next phase of Project Invent’s design thinking process involves prototyping and testing. Using a variety of materials, including electronics and computer code, students create a preliminary version of a solution for the problem they have been working on. This prototype is based on ideas that the group engineers into a tangible form, so that it can be tested with a user audience of people for whom the solution was designed.



During testing, students gather feedback by letting the user audience actually interact with their prototype. As they iterate in their development process, students incorporate this real-world advice and criticism to refine their solutions. Learning to use feedback rather than react to it helps students develop resilience and optimism as changemakers.

Once they have received feedback about their prototype, students make adjustments to their designs and begin to create a plan to build their invention. This phase also requires students to research technologies that may be of use in their projects.

As students build out their inventions, they collaborate with their team to transform their ideas into tangible creations. Together, students must manage their time, adapt to various constraints, and maintain their focus on solving the problem they started with.

Pitch Coaching and Demo Day

Throughout projects, students reflect on their efforts, both as a team and as individuals, to develop their metacognitive skills. At the end of projects, students showcase and celebrate their work by pitching inventions at a “demo day” or demonstration of learning. ▸ Project Invent Demo Day X This opportunity to share knowledge also fosters self-esteem and public speaking skills.

In a pitch, students tell the story of their invention and its potential impact on the world. Students structure their pitches around the problem they are trying to address and use different rhetorical approaches such as data and personal stories to appeal to the emotions of their audience. The better students can articulate the story of their invention, the better they can demonstrate what they have learned through their participation in Project Invent. To support students in preparing their pitch, student teams are assigned to work with an industry volunteer for at least two "pitch coaching" sessions. These sessions help students build confidence and improve presentation skills leading up to presenting at Demo Day. ▸ Alumni Advice: Pitching & Business Plans

Supporting Structures

The Project Invent model was designed to be highly adaptable. Depending on the context, implementation may require shifts in instruction, adult roles, and community partnerships.

CURRICULUM, INSTRUCTION, & ASSESSMENT

Schools must commit to incorporating the Project Invent curriculum into existing courses or programs.

Project Invent offers design thinking curricular resources and frameworks that schools adopting the model can navigate and adapt in their own contexts. Ideally, an entire school or an entire grade would implement the model in a course to help students grow as inventors and innovators. While the curriculum can be used in different subjects, it is often leveraged in computer science courses.

The Project Invent curriculum also provides basic guidance for instruction along with assessment, which comes in the form of feedback and a demonstration of learning.

ADULT ROLES, HIRING, & LEARNING

Teachers facilitating the model must be trained in the design thinking process, ideally by Project Invent.

Because learning in the Project Invent model is largely self-directed, teachers must engage with students as facilitators and guides rather than as a source of specific knowledge. They also need to be focused on helping students develop skills such as communication, teamwork, leadership, and adaptability as they navigate their projects.

To adopt the model with high fidelity, teachers receive training from Project Invent so they are knowledgeable about both design thinking and microcontroller technology. 📑Microcontrollers to Teach Automation Basics However, a background in engineering or technology is not necessary because of the many tools and resources available online and through DIY electronics and microcontroller companies like Adafruit, Sparkfun, Arduino, Micro:bit, and Instructables. 🖥️ Adafruit 🖥️ Sparkfun 🖥️ Arduino 🖥️Micro:bit 🖥️Instructables Project Invent also believes that invention does not have to be high-tech although it does like to challenge students to learn the technology skills important to a high-tech future.

Adopting the model involves committing at least 55 minutes weekly for students to work on Project Invent.

To effectively run a Project Invent program, students should have at least 55 minutes a week to work on their projects in a year-long course, or more frequently in semester-long courses. However, the model is flexible and can be adapted into school schedules in different ways. For example, it could be

SCHEDULE & USE OF TIME

a capstone project in a computer science course, a stand-alone elective course, or an after-school program run as a club. Suggested Program Implementation Timelines

FAMILY & COMMUNITY PARTNERSHIPS

Project Invent's approach to invention education is rooted in using community engagement as a vital source for student growth.

Community partnerships are essential to successfully running the Project Invent model because they are a resource for empathy-building and mentorship. A Community Partner could be an individual who is facing a challenge, or it could be an organization. By engaging directly with Community Partners, students gain real-world experiences and insights that lead to deeper learning. Having a human context for problems they are working on makes the work more authentic and concrete for students while also inspiring them to produce meaningful, high-quality work that impacts a community.

Community Partners also support projects by reviewing student ideas and providing coaching for pitches. Students meet with diverse role models and build important mentorship connections that help them move into STEM careers. Project Invent has volunteers with backgrounds in engineering, design, business, marketing, and entrepreneurship who offer invaluable expertise throughout students' invention journeys.

In the past, contributing Community Partners have included companies like Google, Adobe, Ford Motor Company, Paypal, Sequoia Capital, Toyota Research Institute, IBM, and Apple. Project Invent can help schools develop partnerships and has produced a guide for this process as well.
Community Partnership Starter Pack

TECHNOLOGY & INFRASTRUCTURE

As a part of a partnership, Project Invent provides the basic technology required to fully adopt the model in an innovation kit for students.

The Project Invent model sets a baseline for incorporating technology into projects by providing educators with a Micro:bit or Arduino as part of student innovation kits. Micro:bit Arduino There are no additional technology requirements to adopt the model, but schools can incorporate more if they choose. There are many tools for students to use as they design and invent solutions.

Working with Project Invent directly requires a financial commitment.

Schools interested in adopting the Project Invent model are encouraged to connect with the organization to discuss the budgetary elements of a partnership. However, Project Invent never wants cost to be a barrier for a

BUDGET & OPERATIONS	school, so it provides many free resources including its curriculum and supplementary guides. These materials give detailed insight into the Project Invent model.

IMPLEMENTATION

Supports Offered

Project Invent offers the following supports to help you implement their approach.

School + District Partnerships

Cost Associated

For schools and districts seeking to become leaders in invention education, Project Invent offers partnerships with an extensive level of support. 📑Project Invent Whole School Model. This includes:

- Professional development and coaching for faculty
- Program management, including communication and events
- Collaboration with local and national innovation cohorts
- Broader engagement with Community Partners

Learn More

Fellowship

Cost Associated, Funding Available

Project Invent offers an immersive 4-day training program to prepare teachers to run successful programs. The fellowship includes:

- Design thinking, making, and entrepreneurship training
- Connections to Community Partners and industry experts
- Membership in a cohort of innovative educators
- One-on-one staff support

Learn More

Resources & Curriculum

Free

Project Invent provides free access to its curriculum. It also provides slide decks for activities, case studies, and content that help students work through the design process from defining a problem to building an invention. In addition to their own curriculum, Project Invent has curated other learning resources for students and teachers.

Access Now

Reach

2,190+	200+	300+	83%
Curriculum Downloads	Student Inventions	Educators	Students Attend Title 1 Schools

Impact

Project Invent has proven to be transformative for both educators and students who want to be prepared for the future. 📑 Annual Report 2023

Teachers find that Project Invent improves both their teaching practices and student outcomes.

- 94% report improving their ability to foster empathy in their students.
- 96% report Project Invent improves students' concern and engagement in world problems.
- 91% report Project Invent improves students' ability to manage open-ended projects.
- 89% reported improving their ability to prepare students for future success.
- 100% of educators new to the program gained the confidence to build 21st-century skills.

Students report that Project Invent had a positive impact on them as learners.

- 95% believe they are a more creative problem solver.
- 94% believe they are more passionate about social good.
- 72% feel like they have what it takes to succeed in a STEM-related job.
- 85% believe they can increase their intelligence by challenging themselves.
- 88% say they are capable of learning anything.

Student teams enjoy Project Invent programming. ▸ 2023 FutureFest!

- "Oftentimes as high school students we live in our own little bubble, and Project Invent has taught me how to step out of that bubble and create for others."
- "It's a fantastic opportunity for you to learn new skills and for you to work in a collaborative environment, engage with a Community Partner and learn from their perspectives..."

Contact

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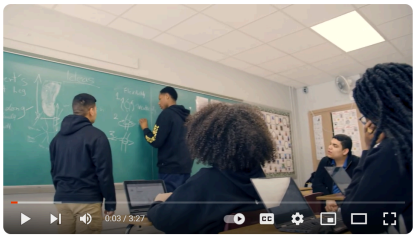
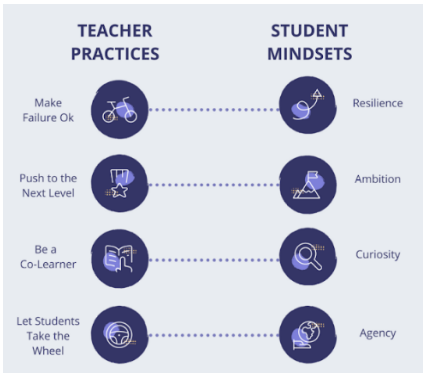
RESOURCES

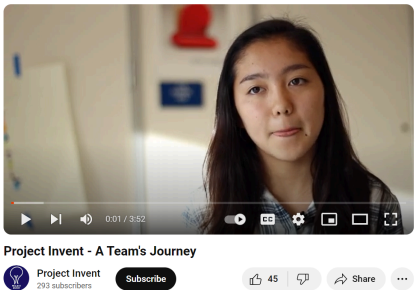


[The Invention Journey]
A video overview of the Project Invent model.

[Project Invent]
A document that provides details about the major components of Project Invent.

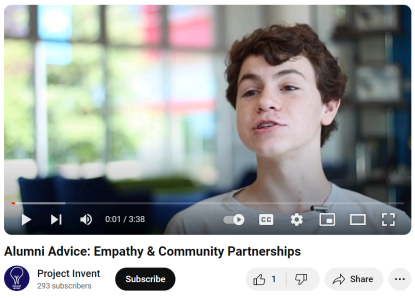


[Teacher Practices Student Mindsets]
A graphic that illustrates the mindsets students develop in Project Invent.

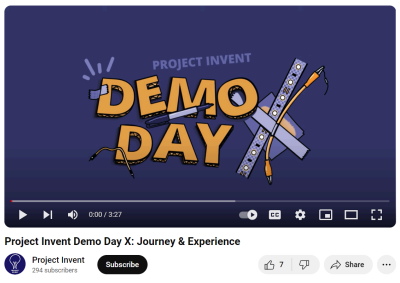


[Project Invent – A Team's Journey]
A video highlighting student interviews about the impact of a student project.

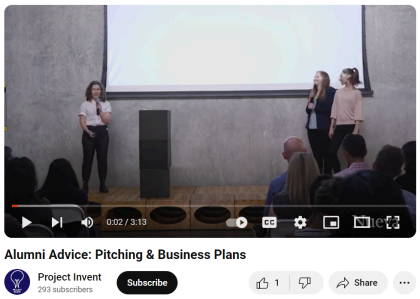
[Project Invent Curriculum]
A toolkit containing resources that support implementing the Project Invent model.



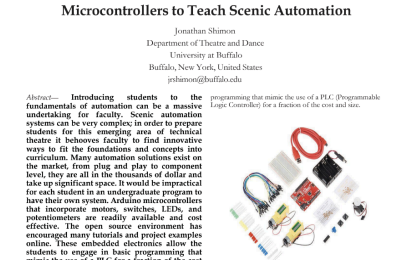
[Alumni Advice: Empathy & Community Partnerships]
A video in which Project Invent alumni explain the role of empathy in projects.



[Project Invent Demo Day X]
A video highlighting student experience during a demo day.



[Alumni Advice: Pitching & Business Plans]

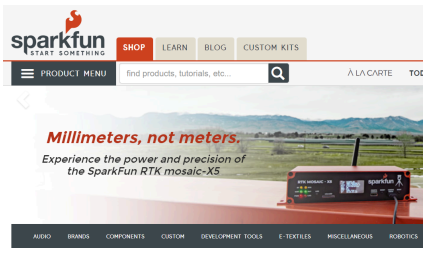


[Microcontrollers to Teach Automation Basics]

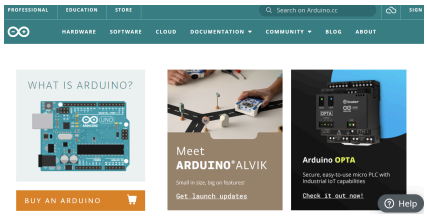
A video in which project invent alumni explain the process of developing and pitching a product.

A document explaining the use of microcontrollers in education.

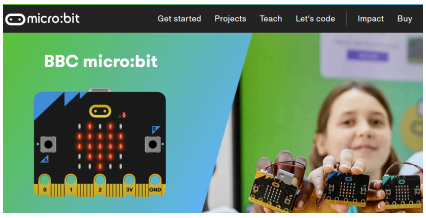
[Adafruit]
A website with information about “learning electronics” equipment.



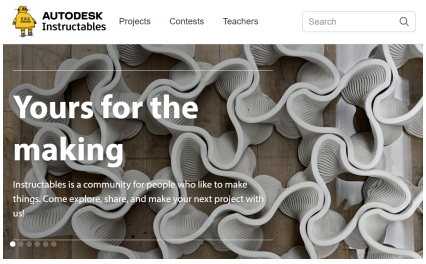
[Sparkfun]
A website about do-it-yourself electronics.



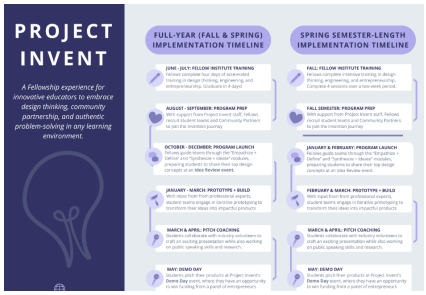
[Arduino]
A website about open-source electronics.



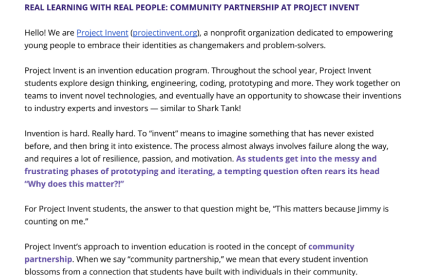
[Micro:bit]
A website of resources to help incorporate hardware and software in classrooms.



[Instructables]
A website that lets people explore, document, and share their creations.



[Suggested Program Implementation Timelines]
A document that illustrates options for implementing Project Invent.


REAL LEARNING WITH REAL PEOPLE: COMMUNITY PARTNERSHIP AT PROJECT INVENT

Hello! We are Project Invent (projectinvent.org), a nonprofit organization dedicated to empowering young people to embrace their identities as changemakers and problem-solvers.

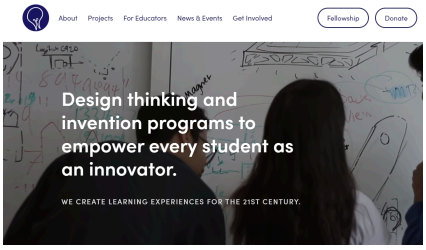
Project Invent is an invention education program. Throughout the school year, Project Invent students explore design thinking, engineering, coding, prototyping and more. They work together on teams to invent novel technologies, and eventually have an opportunity to showcase their inventions to industry experts and investors — similar to Shark Tank!

Invention is hard. Really hard. To “invent” means to imagine something that has never existed before, and then bring it into existence. The process almost always involves failure along the way, and requires a lot of resilience, passion, and motivation. As students get into the messy and frustrating phases of prototyping and iterating, a tempting question often rears its head “Why does this matter?!”

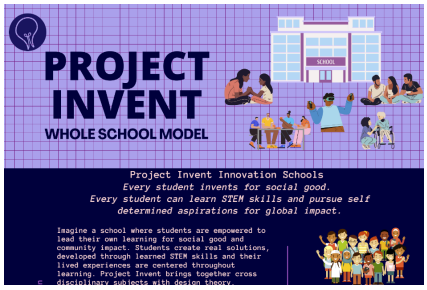
For Project Invent students, the answer to that question might be, “This matters because Jimmy is counting on me.”

Project Invent’s approach to invention education is rooted in the concept of community partnership. When we say “community partnership,” we mean that every student invention blossoms from a connection that students have built with individuals in their community.

[Community Partnership Starter Pack]
A document explaining how to establish community partnerships.



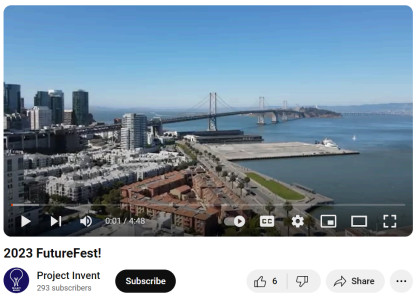
[Project Invent]
The Project Invent website.



[Project Invent Whole School Model]
A document outlining how entire schools might incorporate Project Invent.

[Project Invent Annual Report 2023]

A document highlighting the impact of Project Invent in 2023.



[2023 FutureFest!]

A video highlighting student exhibitions at a national Project Invent event.