Rural Tech Project

Builder: Ravenna Public Schools

RURAL TECH PROJECT

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Builder overview

This builder is organized into six sections, arranged in chronological order: program introduction, foundational considerations, program design and planning, community engagement, program evaluation, and sustainability. Each section describes opportunities and decisions, processes, and outcomes made by one Rural Tech Project finalist team — and offers considerations for developing a similar program in your own community.

About the Rural Tech Project

The Rural Tech Project was a $600,000 challenge to advance technology education, support rural educators, and prepare students for the careers of today and tomorrow. The challenge, which launched in June 2020, invited high schools and local educational agencies to propose technology education programs that use competency-based distance learning.

Five finalist teams each won $100,000 and received on-the-ground support to implement their programs over the 2021-2022 and 2022-2023 school years.

- **iLEAD Academy (Carrollton, Kentucky)**. The Virtual Computer Science Career Academy offers students across five high schools the opportunity to take virtual, dual-credit courses leading to the completion of computer science degrees.
- **Louisa County Public Schools (Mineral, Virginia)**. The Louisa County Cybersecurity Program prepares students to meet a critical need in the workforce through sequential, high-quality course work, work-based learning, and leading industry certifications.
- **Premont Independent School District (Premont, Texas)**. In collaboration with the Rural Schools Innovation Zone, the Leaders in Future Technology Startup Incubator helps students learn about technology and use it to solve real-world problems in their community.
- **Ravenna Public Schools (Ravenna, Michigan)**. The Start the Buzz Let's Grow MainStreet project empowers students to develop competencies and build portfolio experiences in technology, science, and business — with the goal of stimulating economic growth within the Ravenna agricultural community.
- **Woodlake High School (Woodlake, California)**. The Woodlake Aviation Pathway prepares students for regional aviation careers or postsecondary degrees, utilizing drone operations, geometry, and aerodynamic principles.

1. Program introduction: Ravenna

Learn more about Ravenna Public Schools' program, its history and context, and its team.

Description

The Grow MainStreet project from Ravenna Public Schools prepares students for careers in technology, science, and business, with the goal of stimulating local economic growth and building a strong local workforce. Initiated during the Rural Tech Project, the program blends digital, self-guided curriculum with project-based learning to introduce students to a wide range of careers and teach versatile skills that apply to careers in multiple industries.

Grow MainStreet uses the Mavin platform, a free resource available to all schools. The platform provides multidisciplinary curriculum, mental health resources, and career exploration activities.

Outcomes

During its first two years, the program demonstrated success through sustained student engagement and development of career-readiness skills.

- **Student engagement.** Grow MainStreet has engaged hundreds of students from fifth grade through high school graduation. Over 30 high school students have participated in the 10th grade STEM class and the Rural Tech Lab class. Expansion to Ravenna Middle School in the program's second year catapulted Grow MainStreet's reach, with 350 middle school students participating.
- **Career-readiness skills.** Through project-based learning, career exploration activities, and technical skills development, students emerge from the program better prepared to enter the workforce. The high school counselor reported that seniors who have participated in the program are better able to articulate future career goals than their counterparts outside of the program. Students also prepare a portfolio of their projects and work completed during the program, which they can reference in future college applications and job interviews. By leaving with a portfolio, students are more confident in their ability to achieve postsecondary and career success.

Team

The schools and core team members involved are listed below.

- Schools involved: Ravenna High School, Ravenna Middle School
- Team Lead: Greg Helmer (Superintendent, Ravenna Public Schools)

- Community Engagement Manager: Ginger Rohwer (Regional Director, MiSTEM Network, Grand Valley State University)
- Digital platform partner: Sai Naik (President, Mavin Global)
- Digital platform implementation: John Kraus (Project Director, Mavin Consortium of Schools)
- Classroom educators: Ryan Stevens (STEM at Ravenna Middle School), Tracy Lemkie (STEAM at Ravenna Middle School), John Crowell (STEM at Ravenna High School), and Melanie Block (Rural Tech Lab at Ravenna High School)

As you reflect on Ravenna's program, consider:

- What outcomes are you hoping to achieve for your students and broader school community?
- Who within your community might support program design and delivery?

2. Foundational considerations

Before your own planning begins, consider the following foundational elements that were in place when the team at Ravenna first developed Grow MainStreet.

Summary

Ravenna Public Schools was well-suited to a program like Grow MainStreet due to an existing culture of openness among teachers, access to the Mavin platform, and a strong connection between the middle school and the high school.

Located 45 minutes away from Grand Rapids, Michigan, Ravenna is an agricultural community with many small, family-owned fruit farms. For many years, Ravenna High School has run a robust agriculture CTE program to prepare students for careers in the surrounding community. For students who want to pursue CTE programs outside of agriculture, the regional Career Tech Center (CTC) provides some alternative pathways. However, spots in these pathways are limited, and many students are unable to participate.

Opportunity

Ravenna's culture of openness and creativity was the backdrop for the program. Teachers within the middle and high schools are encouraged to take risks and try new approaches in their classrooms. When Grow MainStreet was designed, teachers were primed to consider implementing it in their classrooms.

Grow MainStreet's inclusion into the Mavin platform was instrumental to its success. The Mavin platform was developed to provide all students with access to career-focused

education and technical skills. This presented a solution to one of the challenges Ravenna had faced: Students primarily see careers in the agricultural industry and have less exposure to careers in technology and entrepreneurship. The Mavin platform allows students to learn about a diverse range of careers and build relevant skills from anywhere.

Community support

Just prior to designing the program, the district developed a strategic plan that elevated career-centered education and prioritized project-based learning. Grow MainStreet's alignment with these priorities created an opportunity for built-in, robust district support.

Budget

A high-level overview of Grow MainStreet's budget can be found in Appendix A. One-time equipment costs comprised the bulk of the costs — including beekeeping equipment, 3D printers, and circuit board kits. In addition to what is noted in Appendix A, the Community Engagement Manager role was a substantial development cost.

Grow MainStreet funded its program primarily from the prize purse awarded through the Rural Tech Project.

As you explore designing your own program, consider:

- What does your school have in common with Ravenna's community? What is different about your school?
- What student, community, and/or workforce needs would this program meet?
- What support already exists within your community?
- What funding sources are available?

3. Program details

As you begin thinking about implementation, learn from how Grow MainStreet structured its program design and how it achieved its desired outcomes.

Summary

The Grow MainStreet program reaches students from fifth grade through high school graduation. Middle school STEM teachers and 10th-grade STEM teachers use the Mavin platform in the classroom to supplement their lesson plans. Ravenna High School students may also enroll in the Rural Tech Lab class, a project-based course that teaches students real-world skills for technical careers.

Primary objectives

Ravenna designed the Grow MainStreet program to help students gain exposure to new industries, develop technical skills, and prepare for college and career success.

By using a digital platform, students can learn about industries and professions outside of those found in their nearby community. The program's focus on technical skill development gives students experience using 3D printers, Internet of Things (IoT) devices, and other technologies that students may not otherwise have access to. Finally, students leave the program with a portfolio that represents their competencies, skills, and certifications. In turn, students can reference and share this portfolio to bolster their credibility when pursuing careers or applying to college.

Program activities

The foundation of the Grow MainStreet program is the Mavin platform. In addition to digital learning resources, the program also includes in-person classes, project-based learning, and interactions with local businesses.

Middle school program

Middle school students in the Grow MainStreet program use the Mavin platform to develop career awareness and establish skills. Curriculum on the Mavin platform includes a 3D printing module, which teaches Tinkercad, scaling, and precision measuring, and an IoT sensors module, which teaches the basics of coding, HTML, circuit boards, and precision cutting. The middle school program also introduces students to industries such as food and beverage, transportation, fashion design, and energy production. Students then learn more about the local economy through career fairs that feature nearby businesses.

High school program

10th grade STEM students use the Mavin platform to complete discrete activities, such as a city planning project that teaches operational and logistics skills, and a shoe design project that teaches 3D printing skills.

Students in the Rural Tech Lab class participate in a semester-long, hands-on project that dives deeply into a local topic. In the first year of the program, students learned about beekeeping. They took care of beehives, harvested and packaged honey, and sold products at a local farmer's market. In the program's second year, in collaboration with Grand Valley State University, students conducted an analysis of local water quality. Students visited testing sites, collected samples, identified pollutants, and studied principles of sustainability. In the process of collecting samples, students also spoke with community members who lived near the testing site. Students concluded the project by presenting findings to 125 people, including community members they had met while collecting samples.

Students finish the program by creating a graduate portfolio hosted on the Mavin platform. As part of this process, they create videos that depict their skill mastery and respond to career-readiness prompts. The portfolio also captures course results, highlighting student competencies, and can also expand over time to include certifications, resumes, and other career artifacts. Mavin's employer partners can view student portfolios, giving students a leg up as they pursue careers post-graduation.

Competencies

Competencies developed were predominantly tracked through the rates at which students completed specific job functions within each module. These competencies include:

- **Academic skills**, such as math, physics, computer science, electrical engineering.
- **Technical skills**, such as market analysis, product design and prototyping, and operations and logistics.
- **Career-readiness skills**, such as problem-solving, creativity, independence, and adaptability.

Staffing

Grow MainStreet is supported by staff in both the middle and high schools, individuals in the wider educational ecosystem, and the Mavin team. Roles and responsibilities include:

Grow MainStreet

Role	Responsibilities	Expertise
STEM/STEAM educators	Teach modules from the Mavin platform as part of STEM/STEAM curriculum. Learn Mavin content in order to teach and support students.	Math and/or science education, project-based learning, student engagement.
Rural Tech Lab educator	Teach project-based course that integrates technology solutions into agriscience content for students in agriculture pathway.	Agriculture, science, project-based learning, community collaboration, CTE certifications.
Community Engagement Manager (CEM)	Support teachers, provide problem-solving support, manage grants and reporting.	Community outreach and engagement.
High school and middle school principals	Collaborate with team lead, classroom educators, and CEM.	Program design and instructional leadership.

Role	Responsibilities	Expertise
Director of Curriculum	Support with curricular alignment to standards and pedagogy.	School administration, curriculum design, teaching and learning.
Project Director, Mavin Consortium of Schools	Support Ravenna's administrators and Grow MainStreet educators in implementing modules from the Mavin platform and adapting the curriculum to meet their needs.	CTE, teaching and learning, curriculum design.

Mavin

Role	Responsibilities	Expertise
President	Design and produce online content for modules.	Computer science, talent development.

Time commitment

Before considering capacity to build a program, a team must determine if students, classroom educators, administrators and local community leaders have time available. This includes time to collaborate and iterate with each other and with other community stakeholders.

Program design and implementation. As part of the Rural Tech Project challenge, Ravenna's development of Grow MainStreet spanned three years between proposal and refinement.

Propose	Plan	Run	Refine
June - Oct. 2020	Jan. - July 2021	July 2021 - June 2022	July 2022 - June 2023

In the proposal phase, Grow MainStreet's team lead created the vision for the program, generated buy-in from district leaders, administrators, educators and students, and recruited the right talent. The classroom educators then developed and tested new curriculum while the CEM acted as on-the-ground eyes and support. The CEM worked with the team lead and classroom educators to refine or adjust strategy, providing real-time assessment and student counseling. The CEM also found, built, and maintained relationships with community members.

Below is a table that provides insights into the amount of time stakeholders dedicated to the design and initial implementation of the program over the three years.

Stakeholder	Activities	Time required
CEM	Community outreach and engagement	125 hours per semester
	Reporting	4 hours per semester
Classroom educators	Learning and practicing modules to integrate into curriculum	Completion of initial modules prior to launching with students: 5-10 hours per module Setup and learning 3D printing: 5 hours total Setup and configuration of IoT and laser cutter: 10 hours total
Administrators	Planning and instructional support	10-20 hours per semester for building and district level support 5-10 hours per week for the Mavin Consortium Project Director

Ongoing program execution. Below is a table that describes the amount of time needed to administer and participate in Grow MainStreet after the initial implementation phase.

Stakeholder	Activities	Time required
Students	Middle school (grades 5-8) STEM/STEAM classes	5-7 hours of class time per module (spread over three weeks)
	10th grade STEM class	5-7 hours of class time per module (spread over three weeks)
	Rural Tech Lab class	4-5 hours per week Additional hours (20-40 per year) for participation in Future Farmers of America activities
Classroom educators	Onboarding	2 hours to learn the functionality; 3-4 hours in advance of each module throughout the course.

Stakeholder	Activities	Time required
	Teaching	5-7 hours per module (spread over three weeks)
	Cross-team communication and collaboration	1 hour per week during the time the module is being delivered
	Planning and reporting	1-3 hours per week during the time the module is being delivered
Administrators	Cross-team communication and collaboration	1 hour per week
	Planning and reporting	2-4 hours per semester
Mavin	Instructional support	4-5 hours per semester

Resources

In addition to the staff time required for this program, the team uses the following materials in their courses.

- 3D printers
- Precision laser cutters
- Access to four IoT Grow MainStreet kits
- Beekeeping equipment, such as safety gear and production materials

As you move your program from concept to implementation, consider:

- What program activities will you need to create or adapt to meet the needs of your school community?
- What competencies are you hoping students will develop?
- Within the school community, who will work on this program? How much time could participants (including students, educators, and administrators) spend?
- If current staff cannot fill all the needed roles, who and how will you recruit?
- What additional resources will you need?

4. Community engagement

Learn from Grow MainStreet's community engagement strategy, including the specific individuals and entities involved, and why and how they were engaged.

Summary

Community engagement is vital for CTE pathway development. In the Grow MainStreet program, the team forged connections with school and district leaders, local businesses, and a nearby college to establish a robust program.

Engaging the school community

Early in its design process, Grow MainStreet garnered support at the district level by highlighting the program's alignment with the district's recently developed strategic plan. As a result, Grow MainStreet secured financial and strategic support from this important entity.

After implementing the program at the high school, the team brought the middle school principal on board by demonstrating how career exploration and technology skills could serve students even before entering high school. Within the middle and high schools, teachers are excited to learn how to use new technologies, and are encouraged to take risks, make mistakes, and innovate within their classrooms. This culture of creative risk-taking has made educators across the school consider incorporating elements of Grow MainStreet and the career exploration applications on the Mavin platform in their classrooms.

Grow MainStreet engaged parents throughout program design and implementation. To create awareness, the school employed existing parent engagement structures including informational letters, newsletters, social media posts, surveys about STEM learning and career development, and community updates through regular Board of Education meetings. Additionally, parent feedback came through informal structures such as those staff members with children attending Ravenna Public Schools.

Engaging external partners

During the program implementation phase, Grow MainStreet established connections with select industry partners and local institutions to support specific projects and curriculum expansion. Swanson Pickle Company partnered with Mavin to create videos featuring employees at work. In the second year of the program, Grand Valley State University worked with students in the Rural Tech Lab class to support water quality analysis.

Students also participated in community events to elevate their work in the program. For example, in the program's first year, the students manned a booth at a local farmer's market to sell products they had made during the beekeeping project. In the second year, students hosted a press conference for 125 community members to share the results of their water quality analysis, prioritizing invitations to community members living alongside the water source they had studied. These opportunities made the students and the Grow MainStreet program more visible within the community, increasing awareness and support.

As you design your community engagement strategy, consider:

- How are you already connected with each stakeholder group? Who are your existing champions?
- Who would a dream industry or postsecondary partner be, and what would their partnership bring to the program?
- Who from your existing school community can help forge connections?
- What is your outreach strategy, and what are your expectations?

5. Program evaluation

Learn more about Grow MainStreet's approach to evaluating program outcomes and the tools used to track results over time.

As part of the Rural Tech Project, Grow MainStreet created a logic model (template for reference in Appendix B) to align on the goals, activities, and outcomes they would like to track. When the program was in its second year, the Rural Tech Project provided a tool to facilitate iterative program improvements over a 90-day period: the Plan / Study / Do / Act framework (Appendix C).

Program milestones

Program milestones typically follow school calendars. Given this program's involvement in the Rural Tech Project challenge, Grow MainStreet's program milestones were also situated within the challenge phases. The program milestones listed below follow the challenge structure.

Run	Refine
July 2021 - June 2022	July 2022 - June 2023
• Middle school hosted a career fair. • Middle school piloted early version of Farm to Fridge with all 8th grade STEM students. • High school Rural Tech Lab class implemented beekeeping learning and development. • Students produced honey and other products from hives that they sell at the local farmer's market.	• Middle school adopted the Mavin platform for STEM and STEAM courses. • Middle school students completed four modules on IoT, coding, and cybersecurity. • 10th grade STEM class used the Mavin platform to integrate a module on construction and design. • Rural Tech Lab class implemented a water quality project in collaboration with Grand Valley State University.

Data collection

The team collected data on student engagement, student success, and career outcomes over the course of the two years. They used this data to continuously assess and improve their program.

Student engagement

Grow MainStreet collected feedback from students throughout the program to understand their level of enthusiasm and interest and to identify opportunities for improvement. Students who participated in Grow MainStreet during the program execution phase reported finding the coursework more enjoyable and engaging than other classes, and especially liked the career exploration aspects of the program.

Student success

Data collection focused on student participation and engagement in the program, primarily measured through platform usage. Mavin tracks the rate at which students complete each module; in the aggregate, it illustrates where student interests tend to lie, as students quickly complete some modules and eschew others. It also highlights for the program team potential roadblocks. For example, within the Apparel and Fashion course, the "Printing a 3D Model" module had the lowest rate of completion — indicating that the limited number of 3D printers may be preventing students from mastering the skill. This information can in turn be used to prioritize resourcing for the following cohort.

Career outcomes

Mavin also collects data related to career exploration, tracking the rate at which students write and update career goals on the platform. This data includes information on the industries, companies, job titles, and educational programs students add to their goals. This data reveals career preferences for students and also indicates which careers and industries students may be less familiar with. For example, students who participated in the program in its first two years were most interested in the agricultural industry, but showed some signs of interest in retail, manufacturing, and construction. This information can be used to help the Grow MainStreet team focus on less-visible industries to help students envision a broader array of career paths.

Key improvements

Over the first two years, Grow MainStreet implemented key programmatic improvements and changes to scale its program and adapt to unexpected circumstances.

- **Middle school expansion.** In the first year of the program, the Grow MainStreet team realized that students would benefit from the program prior to high school. The team worked with the principal and educators at the middle school to adapt the program and curriculum on the Mavin platform to grades 5-8 to help students build foundational knowledge in career awareness and technical skills.

- **Curriculum adjustment.** In the second year of the program, Grow MainStreet changed the hands-on project for the Rural Tech Lab class from beekeeping to water quality analysis. This was due to a school construction project that caused the team to relocate beehives off of school property. In response to this unexpected change, the team worked with Grand Valley State University to design the water quality analysis project.
- **Platform improvements.** Mavin worked directly with Grow MainStreet to hone the platform and inform the school's implementation of modules. This constant feedback loop between the implementers and developers helped increase the usability, usefulness, and utilization of the platform and content.

As you determine your own program evaluation approach, consider:

- What are the major milestones you would like to accomplish in the first 30, 60, and 90 days? What would success look like in years one, two, and three of the program?
- What data would help you understand your program's performance?
- How would you collect that data within the systems that currently exist? What could you build or change to collect and analyze that data?
- What would a logic model for your program look like?

6. Sustainability

Learn more about Grow MainStreet's short-term and long-term visions for its program.

Summary

In future years of the program, Grow MainStreet intends to continue its adaptive approach to curriculum development and design. It also hopes to introduce new programmatic elements, such as internships and other interactions with industry partners.

With school construction complete, the Rural Tech Lab class will once again focus on beekeeping. In addition to maintaining and developing products from the hives, students in the class will also build a pollinator garden in collaboration with students in the school's agricultural program.

Teachers will continue to use the Mavin platform in their classrooms, and will work with the team at Mavin to expand course offerings on the platform, ensuring students do not repeat content over multiple years.

Community engagement

Some Grow MainStreet students have already held internships, giving them hands-on professional experience before graduating high school. Grow MainStreet intends to grow the internship program in the future by expanding on the existing relationship with Swanson Pickle Company and by forging new employer partnerships.

In addition to internships, Swanson Pickle Company may also support the program by donating old equipment and creating more opportunities for connection with students.

Staffing

The Mavin platform is designed to be easy for educators to learn and implement in their classrooms. As a result, little additional training or support is necessary. In addition, by relying on a digital platform, the Grow MainStreet program can be scaled to other classes without incurring additional costs or requiring staff time.

Funding

Ravenna Public Schools, Mavin Global, and Michigan State University have collectively received a grant from the U.S. Department of Agriculture to study how rural agricultural communities can increase stability and sustainability during times of upheaval, such as the pandemic. A portion of these funds will be used to cover ongoing costs of the Grow MainStreet program.

As you determine your own program's longevity, consider:

- What are your goals around sustaining and growing your program?
- What is the intended length of the program? Will your program continue indefinitely, or will it be designed to last for a certain number of years?
- For programs designed to exist indefinitely, how might the program adapt to evolving student, school, industry, and community needs over time?
- What would be needed to achieve the goals and vision described above? What staffing, funding, and community engagement would be required?

Appendix A: High-level budget

Budget item	Relevant notes	Approximate amount ($)
EXPENSES		
Beekeeping equipment and infrastructure (including construction costs, protective gear, packaging materials, pollinator garden supplies)	One-time purchase	60,000
Middle school equipment and infrastructure (including 3D printers and a laser cutter)	One-time purchase	40,000
Total spent		**100,000**

Appendix B: Logic model template

PROGRAM GOALS What are your latest program goals? Make updates as needed.	1. 2...

CURRENT CONDITIONS What are the starting resources available for your program? Consider **strengths**, **challenges**, or any neutral conditions you assume will be true and necessary for your program to launch.	**EXTERNAL FACTORS** What are the external factors — **risks** and **opportunities** — that may impact your work? Some factors you might consider to be unpredictable or beyond your control, but others may benefit your program or be manageable with forward planning.
1. 2...	1. 2...

RESOURCES	→	**ACTIVITIES**	**OUTPUTS**	→	**OUTCOMES**	
What resources do you need to achieve your goals?		What are students and staff doing as part of the program?	What staff or structural changes will result from each activity?		What short-term outcomes and measures do you anticipate as a result of each activity?	What long-term outcomes and measures do you anticipate as a result of each activity?
1. 2...		1. 2...	1. 2...		1. 2...	1. 2...

VALIDATION Why are these the right activities to help you reach your target outcomes and goals?	

GAPS What is missing that you will need to consider in order to achieve the desired outcomes?	

Appendix C: Plan / Study / Do / Act framework

Beginning of cycle	**PLAN**	What is the specific process change that you will test and why? What are you hoping to learn? What are your prediction(s)? What specific steps have you planned to enact this change? What data collection tool(s) will you use? When and for long will you test? Who is the project owner(s)? Who else will be involved, including who will be the tester(s)?
End of cycle	**STUDY**	How well were you able to answer each learning question? How do the results compare to your prediction(s)? What did you learn?
	DO	What happened, including what data and observations did you collect?
	ACT	What will you adapt, adopt, abandon, or repeat again — and why?