Rural Tech Project

Builder: iLEAD Academy

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: iLEAD

Learn more about iLEAD's program, its history and context, and its team.

Description

iLEAD Academy is a regional career and technical school that draws students from five school districts located between Cincinnati, Ohio, and Louisville, Kentucky. Following the onset of the COVID-19 pandemic and the rise in remote learning, iLEAD decided to participate in the Rural Tech Project to adapt its existing computer science pathway to a virtual setting.

Students in the five rural districts iLEAD serves did not have access to computer science courses unless they chose to attend iLEAD as a full-time student. The Virtual Computer Science Career Academy allows students to enroll in an iLEAD pathway while remaining at their home high school, preserving students' existing communities.

Outcomes

During its first two years, the program demonstrated success through sustained and diverse student engagement, academic achievement, development of career-readiness skills, and attainment of industry credentials.

- **Student engagement.** The Virtual Academy has had steady student engagement in its first two years, with 26 students participating in the pathway so far. Of the 17 students who began the pathway in its first year, nine opted to continue into year two. All students who completed year two of the pathway and are not graduating are returning for year three. For students in the second cohort, eight students completed the first year of the program, and six will continue into the second year of the program.
- **Academic achievement.** Student academic success was demonstrated through the passage of dual-enrollment courses. Collectively, students who participated in the pathway in its first two years earned a total of 63 dual credit hours.
- **Career-readiness skills.** Through mock interviewing, mentorship opportunities, and job shadowing, students developed career-readiness skills. The program also helped students develop collaboration and communication skills.
- **Industry credentials**. Students who participated in the pathway during the initial implementation phase had the opportunity to earn the ic3 Digital Literacy Certification. Eight students earned this credential.

Team

The schools and core team members involved are listed below.

- Schools involved: iLEAD Academy
- Team Lead: Alicia Sells (Director of Innovation and Communication, Ohio Valley Educational Cooperative)
- Community Engagement Manager: Heather Ackels (Former Executive Director, The INTERalliance of Greater Cincinnati)
- Classroom educators: Eric Gray (Computer Science Teacher, iLEAD)

As you reflect on iLEAD'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

Implementing a new technology education program requires significant investments of time and resources. Before your own planning begins, consider the following foundational elements that were in place when iLEAD first developed its program. This will help you assess whether designing a similar program is feasible in your community.

Summary

iLEAD was well-suited to establishing a virtual computer science program due to its proximity to nearby cities, a growing demand for technology skills in the region, an established in-person computer science pathway, and a lack of similar programs in surrounding communities.

iLEAD is located squarely between Cincinnati and Louisville. Historically, manufacturing has been the dominant industry in the surrounding region. However, as manufacturing experiences the Fourth Industrial Revolution, technology education has become essential to preparing the workforce for these careers.

Opportunity

A gap in existing CTE programs in the state and the rising cost of college created opportune conditions for the virtual computer science pathway. Although tech careers are on the rise in Cincinnati and Louisville, the workforce has not kept pace with open positions: Tech companies are struggling to fill computer science positions. Relatedly, there are few computer science professionals in the region who are interested in teaching high school students. These factors are self-perpetuating, creating a vicious cycle:

Without qualified instructors, schools have little ability to establish computer science CTE programs; without computer science programs, students cannot build skills to pursue careers in related fields; without a qualified workforce, these critical positions remain open. The Virtual Academy allows iLEAD to scale its computer science program to students across the region, increasing the number of high school graduates who are able to pursue these careers.

In addition, the rising cost of college has made students consider options other than pursuing postsecondary education. iLEAD's program lowers the cost of college by providing dual-enrollment classes; it also prepares students for high-paying careers upon graduation.

Community support

Before designing its program, iLEAD held existing relationships with Jefferson Community and Technical College (JCTC) and Northern Kentucky University (NKU). These partners contributed to the design of the pathway, courses, and curriculum for the computer science classes.

iLEAD also held an existing relationship with the INTERalliance of Greater Cincinnati, a nonprofit organization that provides IT-related career exploration resources to students. This relationship was instrumental in the design and implementation of the program.

Budget

A high-level overview of iLEAD's budget can be found in Appendix A. The majority of the budget was used to help pay for the computer science teacher's position. In addition to what is noted in Appendix A, the Community Engagement Manager role was a substantial development cost.

As you explore designing your own program, consider:

- What does your school have in common with iLEAD'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 iLEAD structured its program design and how it achieved its desired outcomes.

Summary

The Virtual Computer Science Career Academy offers dual-enrollment computer science courses to students across five schools. Hosted by iLEAD Academy, students can join classes from their home high school. The program blends virtual learning with work-based learning experiences, mentorships, and paid internships. Throughout the program, students can earn four industry certifications and complete coursework that supports degree programs at Jefferson Community and Technical College (JCTC).

Primary objectives

iLEAD designed the Virtual Academy to scale its existing computer science pathway to reach more students across the five counties it serves. The key goal of the computer science pathway is to prepare students for success in related careers and postsecondary programs. The program seeks to equip students with the skills and credentials necessary to make them strong candidates for employers directly after graduation. For students who wish to continue their education, the pathway's dual-enrollment structure gives them a head-start: Students can enter JCTC with up to six credits toward an associate degree.

Program activities

The program includes four years' worth of coursework and out-of-school programming. Below is a description of each year.

Year One: Introduction to Computer Science

In the first year of the pathway, students develop the fundamental skills of computer science. The program begins with block programming and computational thinking to establish a foundation. As the year progresses, students learn to build websites, design, code, and analyze survey data, and establish a basic understanding of cybersecurity. By the end of the first year, students have learned multiple programming languages and have hands-on experience working in HTML, CSS, Python, Java, C#, and C++.

Year Two: Computational Thinking and Digital Literacy

Students who continue in the pathway in the second year enroll in Computational Thinking, a dual-enrollment class that focuses on the theoretical side of computer science. Students learn to dissect complex problems by breaking them into small pieces and addressing each item one by one. The course builds on the pathway's introductory class with a deep dive into Python. The course consists of short projects that prompt students to solve real-world problems by applying the principles they are learning in the classroom.

Students also learn digital literacy in the second year of the program. This digital literacy coursework helps students meet a prerequisite for the computer science associate degree program at JCTC.

Year Three: Python and Javascript

In the program's third year, students continue to hone their programming language skills. Students take one course per semester to develop their Python and Java skills. Both courses are dual-enrollment and provide students with a certification. In these courses, students apply their programming skills through game design, recreating digital versions of tic-tac-toe and 21, among other games.

Year Four: Advanced Programming and work-based learning

In the fourth and final year of the program, students enroll in an advanced programming class taught at JCTC and complete internships. Advanced Programming is structured around a single capstone project in which students develop a software application to solve a problem in their community. To gain more practical experience, students can also intern for businesses in the region through the scholarship program Future 42, or apply for a remote internship through INTERalliance. Some students may also enroll in a networking class offered outside of the pathway.

Additional activities

In addition to virtual coursework, students also participate in career exploration activities. For example, during the program's initial implementation phase, students participated in a virtual job shadowing day led by INTERalliance. Eleven employers spoke to students about relevant topics, such as software development, web design, data science, and artificial intelligence. Students also participated in mock interviews hosted by Future 42. These partnerships and activities are described in greater detail in the *Community engagement* section.

Competencies

- **Academic skills**, such as math, computer science, and computational thinking.
- **Technical skills**, such as coding in HTML, CSS, Python, Java, C#, and C++, and earning the Microsoft 365 Certified: Fundamentals certification.
- **Career-readiness skills**, such as interviewing skills, resume building, and collaboration.

Staffing

Courses in iLEAD's Virtual Academy are taught by one educator. The team lead and the CTE Director manage partnerships with INTERalliance, Future 42, and JCTC. Roles and responsibilities include:

iLEAD Academy

Role	Responsibilities	Expertise
Computer science teacher	Teaches all computer science courses for the pathway, supports students with exam preparation.	Computer science, cybersecurity, project-based learning.

Role	Responsibilities	Expertise
Community Engagement Manager (CEM)	Connects students with industry professionals for career readiness events and internships.	Community outreach and engagement.
Career and Technical Education (CTE) Director	Collaborates with team lead, classroom educators, and CEM.	Program design and industry relationship building.
Director of Innovation and Communication (team lead)	Manages strategy, builds relationships with policymakers.	School administration, strategic planning, policy advocacy.

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, the development of iLEAD's Virtual Academy 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, iLEAD's team lead created the vision for the program; generated buy-in from district leaders, administrators, community partners, educators, and students; and recruited the right talent. The classroom educator then developed and tested new curricula while the CEM provided additional support. The CEM worked with the team lead and classroom educators to refine or adjust strategy, providing real-time assessment. The CEM and team lead also found, built, and maintained relationships with community partners.

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

Stakeholder	Activities	Time required
CEM	Community outreach and engagement	30-40 hours per semester

Stakeholder	Activities	Time required
	Student support	10-20 hours per semester
	Reporting	20-30 hours per semester
Computer science teacher	Curriculum-building	30-40 hours one time
	Professional development	20-30 hours one time
	Iterating and reporting on curriculum	1-2 hours per week
Administrator	Program design and planning	30-40 hours one time
Community member	Program consulting	20-30 hours one time

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

Stakeholder	Activities	Time required
Students	Class time and coursework	5-7 hours per week
Classroom educator	Onboarding	5-10 hours one time
	Lesson planning	1-2 additional hours of class time and coursework per week in comparison to parallel course; 5-6 hours total per week
	Cross-team communication and collaboration	1 hour per week
	Reporting	1 hour per week
Administrators	Cross-team communication and collaboration	1 hour per week
	Planning and reporting	1 hour per week
Community partners	Cross-team communication and collaboration	1 hour per month
	Mentoring	3-5 hours per week
Employer partners	Work-based learning support	1-2 hours per month

Resources

In addition to the human resources required for this program, the team utilizes the following technologies in their courses.

- Chromebooks (Standard laptops are recommended; see “Key improvements” in the *Program evaluation* section for more details.)

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 iLEAD’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. At iLEAD, the team worked with middle schools to implement virtual student recruitment events, partnered with local organizations that helped them connect students to the business community, and collaborated with local colleges to offer dual-enrollment classes.

Engaging the school community

In collaboration with local middle schools, the team at iLEAD organizes virtual open houses to attract students to the pathway. By hosting sessions virtually and in the evening, iLEAD is able to reach busy parents and students unable to attend recruitment events in person.

iLEAD also uses an esports platform to attract and engage prospective students in virtual tours and open houses. Interest in gaming and esports is one important gateway to students developing an interest in pursuing computer science career pathways. Once in the pathway, students also have the opportunity to join an iLEAD esports club and participate in events and competitions on site. iLEAD’s use of the esports platform shows prospective students how their interests will be reflected in the program.

Engaging external partners

Early on in the program design process, iLEAD established relationships with local nonprofits and nearby postsecondary institutions to build more robust programming for students. iLEAD holds a strong partnership with the INTERalliance of Greater Cincinnati; for the duration of the initial implementation phase, the Community Engagement Manager supporting the pathway also worked at INTERalliance. This close connection allowed iLEAD and INTERalliance to collaboratively design and implement valuable career exploration opportunities.

iLEAD also works with Future 42, a mentorship and scholarship program for students in the surrounding region. Future 42 organizes mock interviews, supports student recruitment efforts, and hosts events to introduce students to local leaders.

Future 42 is located at Jefferson Community and Technical College (JCTC), another iLEAD partner. Through the relationship with JCTC, the pathway offers dual-enrollment classes — allowing students to graduate from high school with up to six college credits. In addition to these credits, students also benefit from access to JCTC's student resources, such as a behavioral health center and other activities and social events. JCTC benefits from the partnership as well, as students who complete the pathway are more familiar with the college and may opt to enroll.

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 iLEAD's approach to evaluating program outcomes and the tools used to track results over time.

As part of the Rural Tech Project, iLEAD 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 pathway 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, iLEAD 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
• First cohort took Introduction to Computer Science.	• First student took Python. • First cohort took Computational Thinking and Digital Literacy. • Second cohort began the pathway. • Students engaged in mock interviews with industry partners. • Students completed a job-shadowing day.

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

In the first cohort, 82% of students completed the first year. Of those who completed the first year, 64% opted to continue into year two. All students who completed the second year of the pathway and are not graduating will stay in the program for a third year. These engagement rates also held true for students in the second cohort, in which eight of nine students completed the year one programming. All six students who were still enrolled at iLEAD after year one decided to continue in the pathway into year two.

Student success

In the first cohort, 14 students finished the first-year course, and seven took the state end-of-course exam. All seven students passed the exam.

Key improvements

Over the first two years, iLEAD implemented key programmatic improvements based on qualitative and quantitative data collection and assessment.

- **Adapting to technology.** The computer science teacher adapted material, particularly for the introductory course, to work on Chromebooks, which do not

support the Microsoft suite of products. Therefore, standard laptops are recommended for future cohorts.

- **Planning lessons for remote learning.** The teacher changed the typical lesson structure to focus on short, 20-minute mini-lessons, recognizing that longer lessons are less likely to keep students engaged in a virtual setting. With the remaining class time, students completed independent practice with teacher or peer support.

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 iLEAD short-term and long-term visions for its program.

Summary

The team lead for the Virtual Academy has worked closely with the state legislature to design We Lead CS, a new statewide virtual computer science pathway that uses iLEAD's program as a model.

In the future, the team intends to have a college and career readiness counselor that has a dedicated focus towards the computer science pathway. This focus will be especially valuable for virtual students, as they often may not receive the same level of career counseling support as students who attend iLEAD on-site.

Community engagement

By establishing more employer partnerships, iLEAD hopes to expand internship opportunities for students in the fourth year of the pathway.

iLEAD will also continue to build on the strong, foundational relationships with Future 42 and INTERalliance, bolstered by students' high levels of interaction with these partners through scholarship opportunities, mentorship programs, and internships.

Staffing

Additional staff will not be needed until the statewide roll-out occurs. Mr. Gray will continue to teach computer science and develop new projects to support his curriculum.

New teachers will likely be needed to teach data science courses.

Funding

iLEAD has applied for a $2 million grant from the National Science Foundation's Computer Science for All initiative. If secured, this grant would provide 20 districts across the state with $30,000 to design middle and high school recruitment programs, with the explicit goal of encouraging more girls to sign up to study computer science.

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		
Computer science teacher salary (50%)	Initial implementation phase (two year total)	71,500
eSports arena room expenses (50%)	One-time purchase	17,000
Mock job interview event expenses	Reoccurring	2,000
Student recruitment expenses	Reoccurring	5,000
Conference attendance for two educators	Reoccurring	3,000
Curriculum licenses for Code HS	Reoccurring	1,500
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?