

# LEADERS

Leadership for Educators: Academy for Driving Economic Revitalization in Science

## An Intervention Model for Including Scientists in Teacher Professional Development

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LEADERS is a partnership of the The University of Toledo, Toledo Public Schools, Toledo Catholic Schools, and Monroe County Schools.

Funded by the National Science Foundation Grant # 0927996



# Introductions

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# Project Goal

To improve science education by making it relevant to students through the incorporation of Project-Based Science (PBS) that is linked to the renewable energies industry and its environmental impacts.

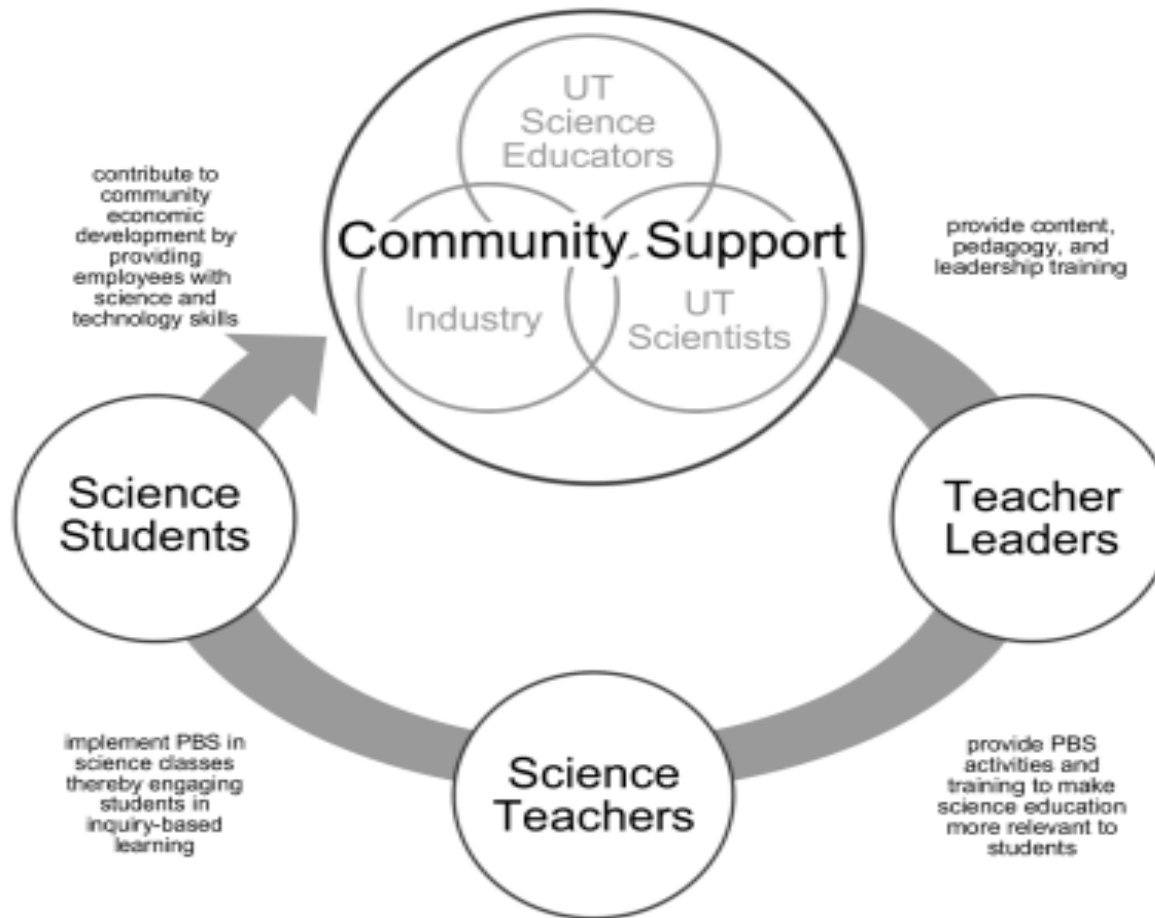


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# Project Overview

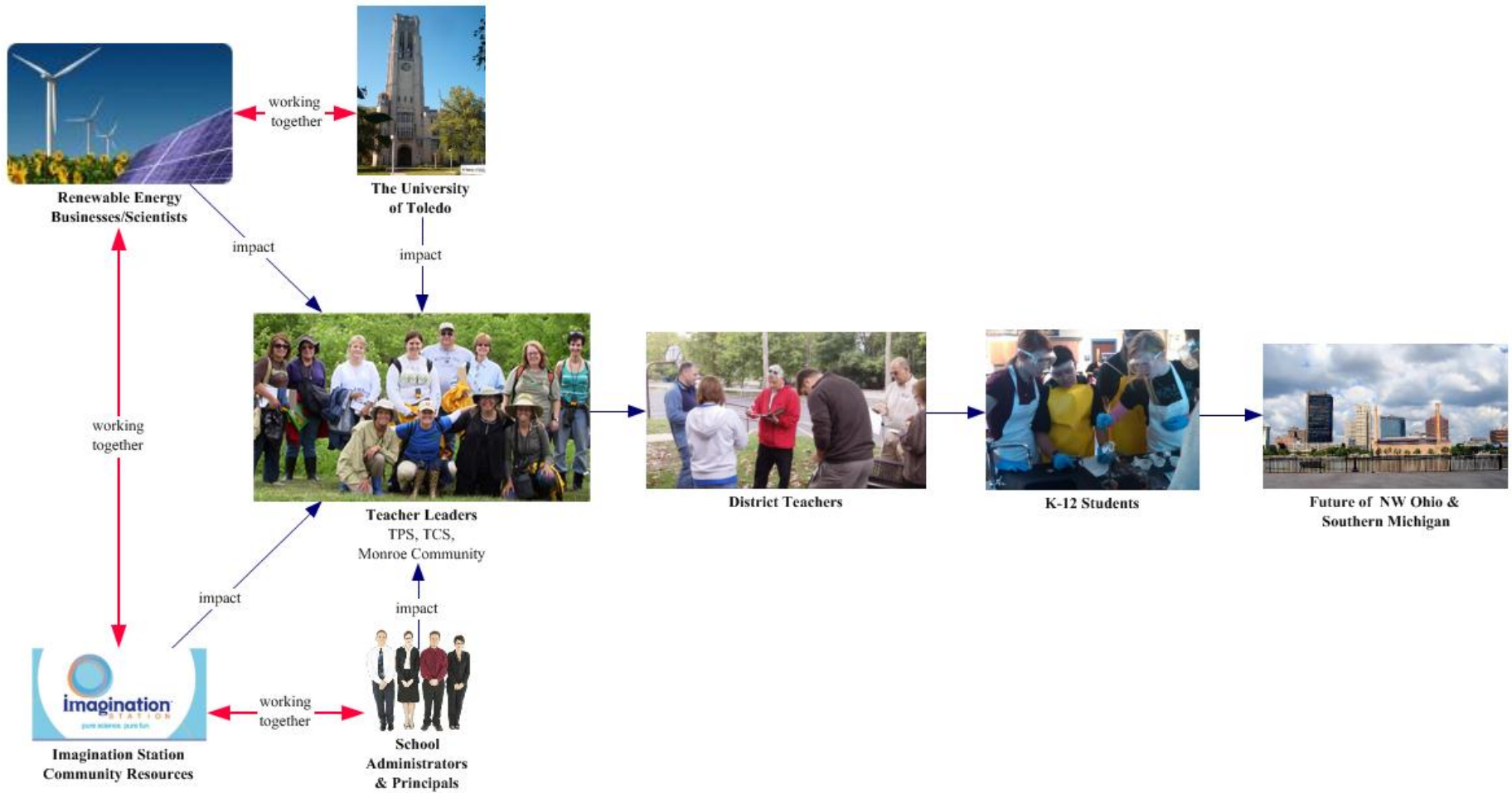


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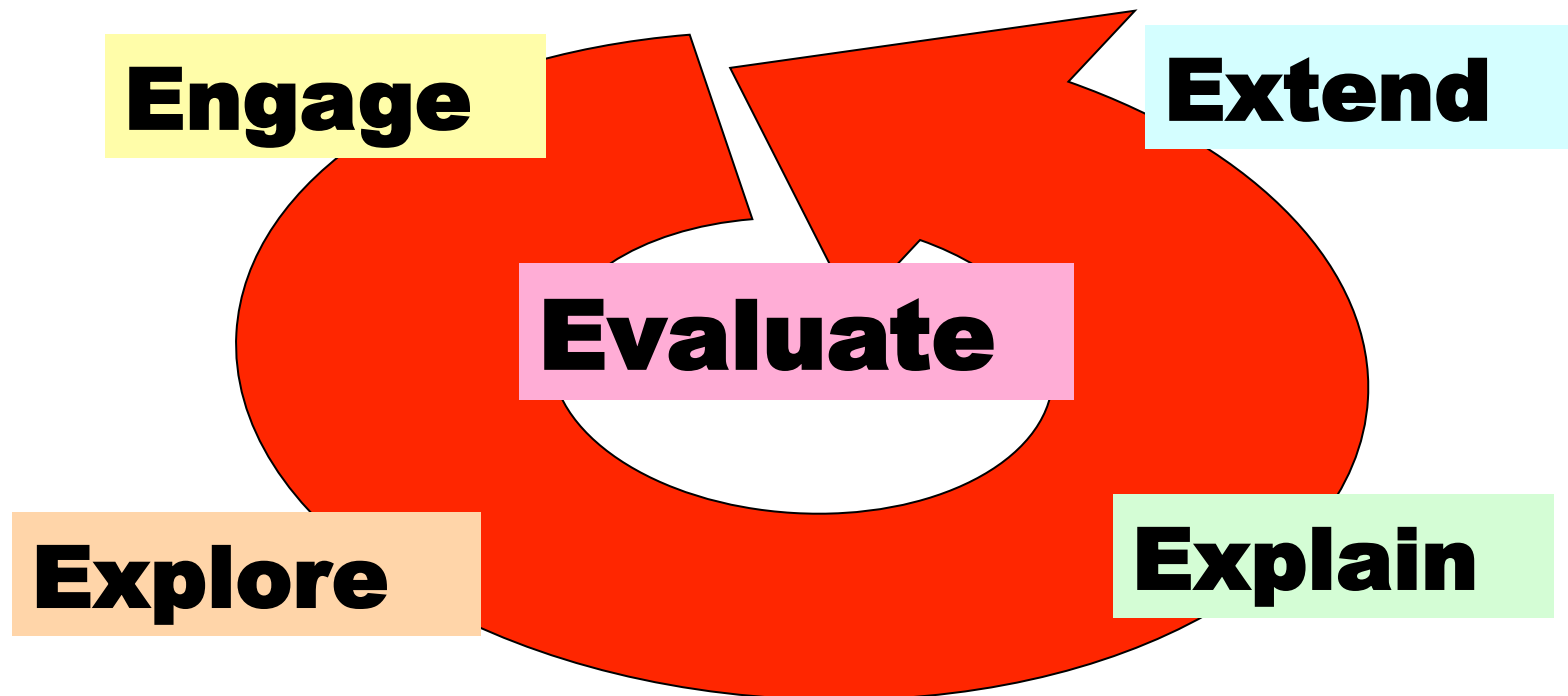
# Project-Based Science

- **Driving Question:** Student designed project centered around answering their question.
- **Investigations:** Students pursue solutions to authentic problems.
- **Artifacts:** Students produce products to represent their knowledge.
- **Collaboration:** Students discuss, try out their ideas and challenge the ideas of each other.
- **Technology:** Students use technology to develop and present their projects.

Krajcik, J., and Czerniak, C. (2007). *Teaching science in elementary and middle school*. New York: Lawrence Erlbaum.



# 5 E Learning Cycle Model



Bybee, R. W. & Landes, N. M. (1988). What research says about the new science curriculum (BSCS). *Science and children*, 25, 35-39.



# Roles

Scientist	Science Educator
<ul style="list-style-type: none"><li>• Develop the syllabus for the course</li></ul>	<ul style="list-style-type: none"><li>• Provide input on the syllabus for the course</li></ul>
<ul style="list-style-type: none"><li>• Decide when the course is taught</li></ul>	<ul style="list-style-type: none"><li>• Work with scientist to develop project-based science activities</li></ul>
<ul style="list-style-type: none"><li>• Submit course request forms to registrar</li></ul>	<ul style="list-style-type: none"><li>• Write the daily lessons and upload to Science Café</li></ul>
<ul style="list-style-type: none"><li>• Produce content information for the course</li></ul>	<ul style="list-style-type: none"><li>• Integrate technology in the lesson</li></ul>
<ul style="list-style-type: none"><li>• Determine what background knowledge is needed</li></ul>	<ul style="list-style-type: none"><li>• Provide K-12 curriculum examples in Science Café</li></ul>
<ul style="list-style-type: none"><li>• Team-teach in the summer</li></ul>	<ul style="list-style-type: none"><li>• Team-teach in the summer</li></ul>

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# Course Schedule 2010

Title	Instructors	Time
Physical Principles of Energy Sources for Humans	Dr. Sanjay Khare/ Dr. Mikell Lynne Hedley	June 14-July 2 9:00 am-12:00 pm
Project-Based Science	Ann Novak	June 14-25 1:00-5:00 pm
Seminars	Community & Industry Partners	June 28-July 2 1:00-5:00 pm
Chemical Aspects of Sustainable Energy	Dr. Dean Giolando/ Rolinda LeMay	July 6-23 9:00 am-12:00 pm
Seminars	Community & Industry Partners	July 6-9 1:00-5:00 pm
Educational Psychology & Science Leadership I	Dr. Charlene M. Czerniak	July 12-23 1:00-5:00 pm

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## Working Model (2010)

- All scientists and their GAs attended a retreat to discuss the LEADERS' vision for the summer courses
- Scientists and science educators plan their courses during the spring semester
- PI and program coordinator were provided monthly updates to



# Year 1 (2010)

- Scientists and Science Educators worked together to develop courses.
- LEADERS PIs did not want assignments for science courses to be lessons. The lessons were reserved for the education course.

Outcome – Teacher leaders were overwhelmed with the amount of content presented.

Teacher leaders struggled to implement Project-Based Science (PBS) in their classrooms. They felt obligated to be content providers in their PDs.



# Course Schedule 2011

Title	Instructors	Time
Earth Technologies	Dr. Kevin Czajkowski/ Dr. Donald Stierman/ Dr. Mikell Lynne Hedley	June 13-June 18 & July 5- 8 8:30 am-5:00 pm
Biofuels	Dr. Glenn Lipscomb/ Rolinda LeMay	June 20-July 1 9:00 am-5:00 pm
Climate Change	Dr. Patrick Lawrence/ Dr. Mikell Lynne Hedley	July 18-22 9:00 am-12:00 pm Continued online in fall
Research & Measurement: Science Leadership II	Dr. Charlene M. Czerniak/ Dr. Toni Sondergeld	July 11-22 1:00-5:00 pm

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# Working Model (2011)

- PI and program coordinator met with scientists and their GAs to discuss the LEADERS' vision for the summer courses
- Scientists and science educators plan their courses spring semester.
- Monthly updates were provided to PI and program coordinator.



## Year 2 (2011)

- Science content courses modeled Project-Based Science more closely.

Outcome – All teacher leaders tried to use PBS in their teaching; some were successful.

PDs led by teacher leaders had more PBS orientation.



# Course Schedule 2012

Title	Instructors	Time
Earth System Science	Dr. Kevin Czajkowski/ Grant Wilson/ Dr. Mikell Lynne Hedley	May-June 22 online
Master's Project	Dr. Kevin Czajkowski/ Dr. Charlene Czerniak	June 11-June 22 9:00 am-5:00 pm
Alternative Energy: Sources, Applications & Economics	Dr. Sorin Cioc / Dr. Abdollah A. Afjeh/ Ted Richardson	June 25-July 6 8:30 am-5:00 pm
Theory of Social Foundations: Science Leadership III	Dr. Lynne Hamer/ Dr. Charlene M. Czerniak	July 9-20 1:00-5:00 pm

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# Additional Support 2012

- Merged LEADERS scientists with scientists involved in NASA Climate Change grant.
- Provided monthly discussions in “Dialogues about Education.”
- Introduced Dr. Mark Templin, Science Education Professor, to scientists.



## Year 3 Cohort 1, Year 1 Cohort 2 (2012)

- Attempted to address only part of PBS, i.e. driving questions and background research.
- One science course was very content driven.

Outcome – Cohort 2 is having challenge understanding how to implement PBS in their classrooms. PD is very PBS driven with little science content.

Recognized scientists needed more instruction on PBS and learning.



# Challenges

- Even with interventions, the teacher leaders were struggling to understand PBS.
- Even with interventions, scientists were teaching, for the most part, in the same way they have taught (mainly lecture).



# Intervention 2012-13

## Fall

- Dr. Templin led bi-weekly discussions about teaching and Project-Based Science with scientists and their graduate assistants.

## Spring

- Dr. Templin continue to meet monthly with scientists and GAs.
- Dr. Templin meets monthly to facilitate the planning of the summer courses.



# Example

- Curriculum vs. Instruction
- Planning Stages
  - Identify the desired results
  - Determine acceptable evidence
  - Plan learning experiences
- Expectations for next meeting



# Results

- Scientists have a better understanding of PBS.
- Scientists are thinking more about how teacher leaders are learning their science content.



# Discussion

- What types of involvement do you have with scientists in your projects?
- What successes are you having in \_\_\_\_ (engaging or changing) scientists' teaching practices?
- What are your challenges? (Projects offer possible resolutions.)





title

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# Thank You!

- Contact information if needed

## LEADERS Information

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