THE UNIVERSITY OF TOLEDO

The College of Arts & Sciences &

The Judith Herb College of Education

LEADERS

Leadership for **E**ducators: **A**cademy for **D**riving **E**conomic **R**evitalization in **S**cience

Kevin P. Czajkowski, Charlene M. Czerniak, and Jan Kilbride

LEADERS Project

Leadership for **E**ducators: **A**cademy for **D**riving **E**conomic **R**evitalization in **S**cience

LEADERS is a mathematics and science partnership that gathers and merges the expertise of four essential entities in the economic revitalization of the Great Lakes Region – K-12 school districts, higher education, the renewable energy industry, and informal science education sites.

- **Goal -** The goal of LEADERS is 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, which is becoming a vital element in the economic development of the Great Lakes Region. By implementing science education reform in four large districts, at the conclusion of the project, over 86,000 students will be affected annually. Twenty-four Teacher Leaders (and participating school administrators) will have over 550 hours of structured professional development. The LEADERS project is divided into four phases: Staff Retreat, Summer Institute, Academic Year Follow Up, and District Science Teacher Professional Development and Community Outreach.

- **Shared Vision -** The goal of student-centered education that knits community economic growth with science education

- **Cohorts -** LEADERS consists of two cohorts of 12 science teacher leaders per cohort. Partnership school districts will nominate six teacher leaders; two each from elementary, middle, and high school levels. Two districts will be served in each cohort.
Cohort 1 – Toledo Public Schools, Toledo Diocese
Cohort 2 – Monroe ISD, Akron City Schools

- **Scholarships and Benefits –** LEADERS scholarships cover the costs of tuition for the coursework (valued over $15,000), all fees, and books. Each participant will receive $3,000 stipend for each summer of attendance. Scholarships are limited to 12 teachers. Released time given (two days per month for 10 months) to collaborate on PBS activities, science teacher professional development, and community outreach.

- **Partners**
  - College of Arts and Sciences
  - Judith Herb College of Education
  - Toledo Public Schools
  - Toledo Diocese Schools

  Supporting partners
  - UT College of Engineering
  - Akron City schools
  - Monroe County School District
  - Monroe County Community College
  - Toledo Imagination Station
  - Blue Water Satellite
  - TechniGraphics
  - Wright Center for Photovoltaics Innovation and Commercialization
  - Great Lakes WIND Network

- **Participants**

  Scientists and Engineers
  - Abdollah A. Afjeh – Mechanical Engineer
  - Sorin Cio – Mechanical Engineer
  - Dean Giolando – Chemist
  - Sanjay Khare – Physicist
  - Patrick Lawrence – Environmental Geographer
  - G. Glenn Lipscomb – Chemical Engineer
  - Donald J. Stierman – Geophysics Scientist

  Science Education Faculty
  - Dr. Mikell Lynne Hedley
  - Rolinda LeMay
  - Ann Novak

  Principal Investigators
  - Kevin Czajkowski
    College of Arts and Sciences
    Geography and Planning
  - Charlene M. Czerniak
    Judith Herb College of Education
    Science Education
  - Jan Kilbride - Toledo Public Schools

  Staff
  - Janet Struble - LEADERS Program Coordinator
  - Gale Mentzer - LEADERS External Evaluator

- **Science Café -** To facilitate communication and networking among teacher leaders, project staff, and supporting partners, an innovative element of LEADERS is the use of a *Science Café,* developed as part of this project, to engage our community of teacher leaders throughout the AY. The *Science Café* will be a virtual meeting space that utilizes an online environment supporting productive and professional collaborations. This web-based communication supports professional interactions over time and in multiple locations to promote ongoing professional collaboration through mentoring provided by an expert.

- **Network Coach -** LEADERS is unique in that it recognizes that it is unrealistic to expect teacher leaders to accomplish the daunting task of transforming science education alone and therefore has included a network coach (NC), school district principals and administrators, university science educators and scientists, informal science, and industry partners in the implementation team. The NC will visit the teacher leaders throughout the AY to assist them with overcoming roadblocks, to accompany them on outreach activities, and to review and assist the teacher leader in meeting deadlines for project implementation. The NC will focus on inspiring teacher leaders to enact change through PBS by providing ongoing support during challenging times.

Summer Institute I — 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
Science Leadership and Professional Development Design	Dr. Charlene Czerniak	July 12-23 1:00-5:00 pm

Summer Institute II — 2011

Title	Instructors
Earth System Science	Dr. Kevin Czajkowski
Earth Technologies	Dr. Donald Stierman
Climate Change	Dr. Patrick Lawrence
Science Leadership & Professional Development Design II	Dr. Charlene Czerniak
Seminars	Community & Industry Partners

Summer Institute III — 2012

Title	Instructors
Biofuels	Dr. G. Glenn Lipscomb
Alternative Energy: Sources, Applications & Economics	Dr. Sorin Cioc & Dr. Abdollah A. Afjeh
Environmental Planning	Dr. Patrick Lawrence
Science Leadership & Professional Development Design III	Dr. Charlene Czerniak
Seminars	Community & Industry Partners

Timeline of Activities

	Year 1 AY	Year 1 SU	Year 2 AY	Year 2 SU	Year 3 AY	Year 3 SU	Year 4 AY	Year 4 SU	Year 5 AY	Year 5 SU
Cohort 1	Planning & Recruitment	Courses: Renewable Energy PBS Leadership	Follow Up Activities District wide PD	Courses: Renewable Energy Leadership	Follow Up Activities District wide PD	Courses: Renewable Energy Leadership				
Cohort 2					Planning & Recruitment	Courses: Renewable Energy PBS Leadership	Follow Up Activities District wide PD	Courses: Renewable Energy Leadership	Follow Up Activities District wide PD	Courses: Renewable Energy Leadership

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The Project

LEADERS is striving toward the following outcomes:

1. Developing a cadre of effective teacher leaders who are capable of transforming science education by linking science content with emerging science-based industries in the Great Lakes Region.
2. Increasing the number of teachers in partnering districts who have strong content, pedagogy and leadership skills and knowledge.
3. Transforming existing K-12 science courses to rigorous and relevant science courses through PBS.
4. Preparing K-12 students who meet science and mathematics achievement standards while also becoming interested in science and technical careers.
5. Developing community science education networks that collaborate through the development and implementation of advanced or improved science courses.

The overarching research questions this project will address (& related project outcomes) include:

- How effectively can teacher leaders transform science education by linking science content with emerging science-based industries through PBS (Outcome 1 and 2)?
- How does linking local science-based economic development with science curriculum alter student attitudes about and interest in science topics (Outcome 4)?
- Does improving teachers' content and pedagogical knowledge and leadership skills develop effective teacher leaders (Outcome 1)?
- How does linking local science-based economic development with science curriculum affect student learning in science (Outcome 3 and 4)?
- Does participation in a professional development program that includes rigorous content, PBS strategies, and leadership development improve a teacher's ability to implement change within the school district (Outcome 1)?
- What types of supports or combination of supports are needed to facilitate teacher leader implementation of transformative science education practices (PBS)? How does a teacher leader balance these supports to get the best possible results (Outcome 5)?
- How does a partnership between school districts, higher education, informal science, and industry affect each of the partners; what are the unanticipated positive outcomes (Outcome 5)?
- Does a community science network provide the guidance and support necessary to ensure both new and veteran science teachers implement inquiry-based instruction (Outcome 5)?

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