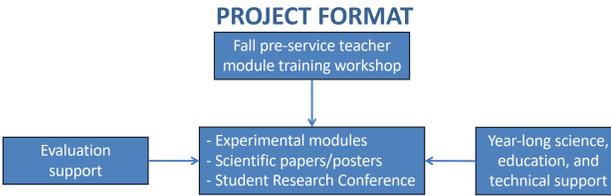




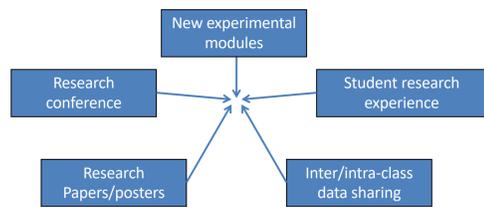
PROGRAM DESCRIPTION

The underlying goal of the UW-Milwaukee SEPA grant is to prepare pre-service teachers to introduce inquiry/research into their teaching that connects concepts in life science to related issues in environmental health and thereby addressing the NGSS standards.



Combine pre-service teacher development and student science experiences that reinforce student learning and support the Next Generation Science Standards.

STUDENT SCIENCE LEARNING ACTIVITIES



SCIENCE CONTENT - MODULES

ZEBRAFISH AS MODELS: STUDYING THE EFFECTS OF ENVIRONMENTAL AGENTS ON HUMAN HEALTH

Effects of Ethanol, Nicotine, and Caffeine Exposure on Embryonic Development

Using zebrafish as models, students examine the general development of zebrafish embryos and malformations that occur due to exposure to various environmental toxicants.



NERVE AND MUSCULAR BASIS OF EARTHWORM MOVEMENTS

Effects of Physical and Chemical Environmental Agents

This module investigates the use of earthworms as a model organism for studying neurotoxic effects on the human nervous system.



THE EFFECTS OF LEAD EXPOSURE ON FATHEAD MINNOW

Connecting Behavior and Physiology

This module is a hands-on investigation of the effects of lead on fathead minnow reproductive behaviors.



EFFECTS OF TOXIC CHEMICALS ON LEARNING AND MEMORY

Using Fish as a Model for Human Environmental Health

This hands-on module uses zebrafish or fathead minnows as models for the effects of lead by using an experimental protocol that is flexible so that a variety of student-directed questions can be answered with fish in a T-maze.



Empowering Pre-service Teachers and Students With Environmental Health Research

David Petering (petering@uwm.edu) and Craig Berg (caberg@uwm.edu), Co-Principal Investigators Renee Hesselbach (hesselba@uwm.edu), Outreach Specialist University of Wisconsin - Milwaukee

PRE-SERVICE TEACHER WORKSHOP

To prepare pre-service teachers to effectively incorporate the inquiry-based modules into their curriculum, they participate in an intensive workshop at the UW-Milwaukee School of Freshwater Sciences.

- a discussion of the scientific process
an introduction to environmental health concepts
an examination of responsible and ethical conduct of research
hands-on training sessions of the zebrafish and worm experimental modules
instruction on web and communication tools

In their student teaching, pre-service teachers are paired with master teachers who have experience doing the modules and together, they introduce them to their students.



FALL RETREAT

To further support teacher success in the classroom, the WinSTEP program staff hosts a Fall Retreat for pre-/in-serve teams at the UWM School of Freshwater Sciences.

- responsible conduct of animals in research
chemical hygiene and safety
scientific papers and communication tools
master teacher reflections panel
nicotine and the e-cigarette epidemic, with a specific focus on incorporating e-cigarette toxicity into the zebrafish module
ABT storymaking approach to research communication
proposed WinSTEP Teacher Certification in Guided Inquiry Program



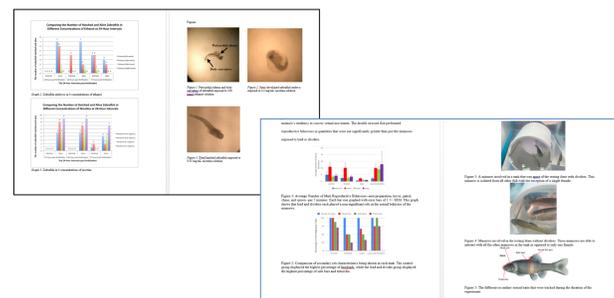
STUDENT PARTICIPATION IN THE SCIENTIFIC COMMUNITY EXPERIENCE

RESEARCH COMMUNICATION

Research Papers

Developing the skills to organize, synthesize, interpret, and communicate research in an orderly report is key for the dissemination of scientific information.

- relevant science content
methodological detail
experimental findings including various means of representation
meaning or interpretation of the results

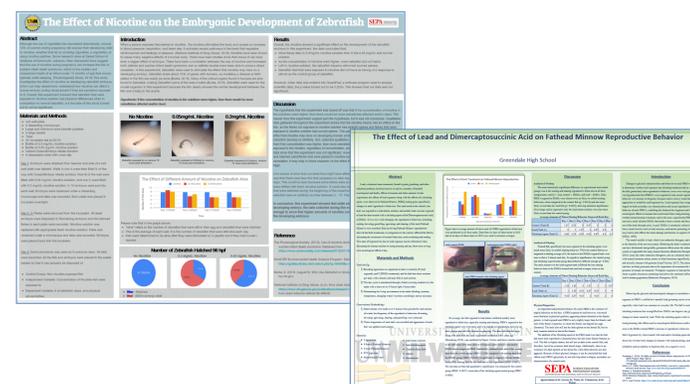


Papers are shared within and between classrooms to stimulate student reflection and discussion on the variety of experimental methods utilized, the range of results obtained, and the meaning of these results.

Research Posters

In addition to writing research papers, students are encouraged to create scientific posters based on their SEPA research. Resulting student posters are displayed at the WinSTEP SEPA Student Research Conference.

Sample Student Research Posters:



STUDENT INQUIRY AND RESEARCH EXPERIENCE EVALUATION DESIGN

The evaluation process makes use of a combination of formative and outcome measures and tools, adhering to National Science Education Standard positions on assessing science education.

- Increases the knowledge of participating pre-service teachers about how the use of experiment modules involving environmental health problems can address the New Generation Science Standards (NGSS) and enhances teachers' ability to help stimulate inquiry/research in the classroom.
Enhances students' capability (1) to meet NGSS, (2) to understand life science content related to the modules, and (3) to understand environmental health science and the impact of the environment on health.
Results in diverse participation with regard to race/ethnicity and gender among both pre-service teachers and students; leads to greater numbers of minority, low income, and female students in STEM education.
Has a sustained institutional impact on participating schools

SEPA EVALUATION INSTRUMENTS

Table with 3 columns: Instrument, Respondents, and Description. Lists various evaluation tools like Pre-Service Teacher and Early Career/Master Teacher Instruments, Mid-Year Focus Group, etc.

Evaluation Consultant: Barbara Goldberg & Associates, LLC (barbaragoldb@gmail.com)

2019 WinSTEP SEPA STUDENT RESEARCH CONFERENCE

APRIL 9, 2019

To highlight the research activities of the participating middle and high school students and teachers, the WinSTEP SEPA team hosted a student research conference at UWM.



Student Poster Presenter

Student Artwork

Program Booths and Posters

For the 2019 conference:

- 169 student research posters were submitted, evaluated and presented
130 student research papers were submitted and evaluated with the top 4 papers being presented at the conference



Student "Passport"

WinSTEP SEPA CONFERENCE SCHOOL PARTICIPANTS

- Christ King School*
Germantown High School*
Lake Country Middle School*
Morgan Butler Middle School
Milwaukee Rufus King High School*
Seymour Community High School
Union Grove High School
Waukesha South High School*
Cudahy Middle School*
Greendale High School*
Mauston High School*
Milwaukee Hamilton High School*
Muskego High School*
South Milwaukee High School
Waukesha North High School
Waukesha STEM Academy*

* Schools that have hosted pre-service teachers who are now in the field, or schools with new early career teachers who have gone through the UWM WinSTEP SEPA program and are now currently teaching.

In addition, during the 2018-19 school year, the WinSTEP team worked extensively with two master teachers in the WinSTEP program to develop a new year-long Environmental Health science course, using the four WinSTEP modules as the backbone of the curriculum.

2017-2018 SAMPLE EVALUATION RESULTS

During the 2017-2018 academic year, 8 master teachers working with 15 pre-service teachers exposed 747 students to the zebrafish and earthworm modules.

- 2018 workshops were very well received by the pre-service teachers. The zebrafish module workshop received an overall GPA of 3.8/4.0, and the earthworm module workshop received an overall GPA of 3.6/4.0
100% of pre-service teachers reported they gained new understanding and skills to teach middle and high school science having presented or observed the modules
Student opinions shifted significantly from pre- to post-tests for both modules that "seeing how an environmental agent affects fish/worms helps me understand that those same agents can also affect me"
95% of students gave the 2018 Student Research Conference an overall grade of "A" or "B". 100% of teachers gave the conference an overall grade of "A"
Overall, 23 schools participated in the WinSTEP program for the 2017-2018 school year.

PROGRAM WEBSITE AND LIBGUIDE

The WinSTEP website provides a portal for program teachers and students to access information about the: 1) program in general, 2) LibGuide, 3) curricular modules, 4) WinSTEP SEPA team member roles and contact information, 5) Student Research Conference and Online Journal, and 6) teacher and student resources.



WinSTEP Program Website

WinSTEP Program LibGuide

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