MISO
Maximizing the Impact of STEM Outreach
Science, Technology, Engineering and Mathematics

Fall Workshop
October 27, 2011
1:00-3:00 pm

MISO

MISO Fall Workshop Agenda

Welcome
Preparing Tomorrow's Workforce for Tomorrow's Jobs
Workshop Purpose and Goals
Using Survey Data
Break
“Duke” Database Information
Website Overview
MISO Next Steps Discussion
Workshop Evaluation

Eric Wiebe
Jim Zuiches
Jeni Corn
Jeni Corn

Tricia Townsend
Tracey Collins
Jeni Corn
Preparing Tomorrow's Workforce for Tomorrow's Jobs

Presented by James J. Zuiches, Vice Chancellor for Extension, Engagement, and Economic Development

MISO Fall Workshop Goal

• The goal of the workshop is to assist participants with:
  • Learning about the MISO survey development procedures and exploring possible survey data uses in your research projects
  • Understanding how information from the NC Educational Research Data Center ("The Duke Database") can be used in your research projects
  • Understanding the functionality features of the MISO website to promote your project
  • Discussing upcoming MISO project activities
Using Survey Data

- Our goal is to help MISO Partners use data to continuously monitor and make effective decisions to improve their programs for the benefit of their stakeholders.

MISO Data Analytics Flow Chart

**Objectives**

- Students: How do students feel about learning STEM content and future career paths?
- Teachers: How confident are teachers about teaching STEM-related content?
- Students: How has student academic achievement changed over time?
- Teachers: To what extent do teachers attain professional growth and remain in-field?
- Students: Did MISO Project Partner Participants that entered NCSU pursue a STEM-related degree?

**Variables of Interest**

- Surveys developed by MISO Project Team to help MISO Project Partners to measure student STEM Attitudes, Interest in STEM Careers, and 21st Century Learning Skills, and teacher confidence and efficacy in teaching STEM (NC State K-12 STEM Outreach Programs)
- Existing NC education database that includes teachers' education/licensure, experience, turnover; and students' academic progress, attendance, course taking, growth and proficiency by academic subject, grade promotion and retention, transfer, dropout, and graduation status. (All NC K-12 Public School Teachers and Students)
- All information related to student applications and enrollments for the University such as high school course grades/GPA, high school class rank, SAT scores, AP test scores, university enrollment, university matriculation, and university course grades/GPA. (All NCSU Students)

**Data Sources**

1. MISO Common STEM Survey Tools for Outreach Participants (teachers & students)
2. NC Educational Research Data Center (NCERDC) at Duke University
3. NC State student database maintained by Enrollment Management and Services

**Goal**

To determine the extent to which STEM outreach programs impact long-term educational outcomes.
Using Survey Data

- Pilot phase of MISO surveys is in process to:
  - To establish validity and reliability of the survey instruments
  - To eliminate or rework specific survey items

Using Survey Data

- MISO Survey development was guided by research and is derived in part from existing surveys
- Surveys may be completed via a web-based survey tool
  
Using Survey Data

- Teacher Surveys
  - Teacher Surveys measure teacher confidence and efficacy in teaching STEM related content
  - STEBI-Science Teaching Efficacy Belief Instrument (Enoch & Riggs, 1990)
  - MTEBI-Math Teaching Efficacy Belief Instrument (Enochs, Smith, & Huinker, 2000)
    - added engineering, technology, elementary

Using Survey Data

- Student Survey measures STEM Attitudes, Interest in STEM Careers, and 21st Century Learning Skills
  - STEM Attitudes and basis for Career Exploration: adapted from an Evaluation of Women in Engineering (Erkut & Marx, 2005)
  - 21st century Learning: adapted from NC Student Learning Conditions survey developed at the FI
Using Survey Data

- Conduct Statistical Analyses
  - Exploratory Factor Analysis
  - Confirmatory Factor Analysis
- Teacher
  - Original Survey-STEIBI with 23 Items loaded to factors (subcales)- 1) Personal Science Teaching Efficacy Belief Scale and 2) Science Teaching Outcome Scale
- Once the pilot survey window is closed, analyses will be done to assess the validity and reliability of our surveys to see if factors hold stable for each survey

Data in Practice

You have a valid and reliable survey...

Now What?!!
Data in Practice

- Use the survey data to conduct formative and summative evaluation procedures for your projects

“When the cook tastes the soup, that's formative evaluation. When the guests taste the soup that is summative evaluation.” ~ Bob Stake

Data in Practice

Steps
1. Identify the critical elements of the project (logic model).
2. Ask important questions about your projects.
3. Check whether data already available to help answer your questions and then determine the additional data sources needed.
4. Collect, analyze, and interpret data to answer your questions.
Data in Practice

- Selection of sources and methods are totally dependent on the questions you ask.
- You should consider a wide array of data types and sources.
- Quantitative data are analyzed using descriptive or inferential statistics.
- Qualitative data are analyzed for patterns or themes.
- Data must be interpreted, not just analyzed.

Data in Practice

Common Data Traps
- “Biting off more than you can chew”
- Not collecting data needed to answer important questions
- Collecting data that is not really useful
- Neglecting hard-to-quantify data
- Not formalizing “informal data” (e.g., anecdote, unrecorded observations)
- Not using valuable data after it has been collected
Small Group Activity

- Divide into two groups
- Review MISO Survey Student Report
- Review MISO Survey Teacher Report
- Answer the guiding questions provided on the next slide.
- Be prepared to report out.

Guiding Questions

1. What are the results? How would you summarize the data?
2. What do the results mean for your project?
3. What decisions would you make about various aspects of your project?
NC State University

College of Education

BREAK

Take a Break

NC State University

College of Education

NC Education Research Data Center 101

- Established in 2000 through a partnership with NCDPI
- Data Sources:
  - NCDPI, NCES, US Census, US DOE
  - Data from the mid-1990s forward
- Longitudinal dataset with the ability to track students and teachers over time
  - E.g. - a teacher's qualifications can be linked to school characteristics, and student academic performance can associated with district attributes
NC Education Research Data Center 101

- Sample Variables
  - Students: test scores, free or reduced lunch eligibility, exceptionality status, dropout status, and incidents requiring disciplinary action
  - Teachers: Degree obtained, salary, work history, attendance, licensure, teaching in field status
  - Schools: school demographic composition, average test scores (End of Course, End of Grade, and SAT), dropout rates, and state recognition status under the ABCs accountability model.
  - School Districts: district composition, incidents of violence, district finances (revenues and expenditures), and average test scores.

NC Education Research Data Center 101

- MISO Information
- Data pull for all students from MISO partners
  - Need full name, DOB, NC WISE number or teacher ID number
  - Sample must be ≥ 20 so that individual students can not be identified within your project
    - If < 20, you will only receive data aggregated across all projects
MISO Website

As part of the MISO project, a new website has been launched, in order to better serve the K12 community and the NC State STEM outreach community - [http://miso.ncsu.edu](http://miso.ncsu.edu).

On this website, you will find an easy-to-use search engine, where anyone can easily find K12 STEM outreach activities and opportunities for teachers, students and educators, such as camps, academies, workshops, group activities and campus departmental tours - [http://miso.ncsu.edu/students-parents-teachers](http://miso.ncsu.edu/students-parents-teachers) [http://miso.ncsu.edu/groups](http://miso.ncsu.edu/groups)

This website is a collaboration between the North Carolina Cooperative Extension and funded by the Extension Seed Grant, Connecting Students to 21st Century Careers, from the Office of Extension, Engagement and Economic Development, and MISO, an NSF funded grant (DRL #1038154), that is working to creatively integrate longitudinal evaluation with innovation within NC State’s K-12 outreach programs, particularly those funded by NSF, to help ensure the breadth and depth of the future U.S. STEM workforce.

MISO Website

- You can register as a provider on the website, and post your program’s events and opportunities using your NCSU email address: [http://miso.ncsu.edu/provider-learn-more](http://miso.ncsu.edu/provider-learn-more)
- We have 35 registered users, and 15 opportunities created to date.
- After being approved as a provider (using your NC State email as your user name), you will be able to add new opportunities and edit existing opportunities whenever you like - [http://miso.ncsu.edu/wp-login.php](http://miso.ncsu.edu/wp-login.php)
MISO Website – Create An Opportunity

- Click on “create an opportunity” - http://miso.ncsu.edu/providers
- Fill out the form and save

MISO Next Steps

- Spring surveys
- Spring workshop - NCSU Enrollment Data Overview
- Workshop Evaluation