The Maryland Upper Elementary/Middle School Science Teacher Professional Continuum Model

PI: J. Randy McGinnis, University of Maryland
Co-PIs: Spenser Benson, UMD; Scott Dantley, Bowie State University
Senior Personnel: José Barata, Hands On Science Outreach; Gili Marbach Ad, Tel-Aviv University, Israel
Research Assistants: Amy H. Dai, Megean E. Garvin, Rebecca S. Pease, Wilkinson Unugboji

Contact: Project Nexus,
Room 0108L, Cole Field House,
University of Maryland
College Park, Maryland 20742,
www.projectnexus.umd.edu
Contract grant number: ESI O455752.

Summary

Project Nexus promotes quality science education by developing and testing an exemplary model that prepares supports and sustains *upper elementary and middle level* specialist science teachers. Project NEXUS teachers will benefit from a baccalaureate program that features connecting transformative undergraduate science content courses with science method courses, supported internship experiences with adolescent students in informal education contexts, field placements in urban professional development schools and ongoing innovative educational experiences addressing the needs of minority and urban students, participation in an induction LISTSERV, and continuous university, public school district, and informal education support during their induction years. Participants in the 5-year project include 150 new specialist science teachers and 40 practicing mentor teachers (formal and informal science education domains).

Rationale

- Current need in science teacher preparation
  - To increase the number of elementary teacher education majors who concentrate in science, particularly those typically underrepresented
  - To increase the number of qualified upper elementary/ middle school science teachers, particularly those typically underrepresented
- Builds on previous research
  - Maryland Collaborative for Teacher Preparation (MCTP), a National Science Foundation funded project in the CETP.

Central Research Question

To what extent of success (and for what reasons) can undergraduate elementary teacher education majors, particularly those from currently underrepresented groups, with demonstrated interest and performance in science be:

recruited and *prepared*

to teach upper elementary/ middle science in a manner consistent with standards-based recommendations?

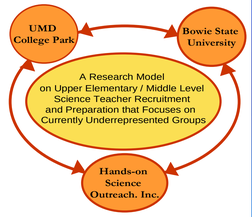
Theoretical Framework

The key assumption is that science educational practices require systemic reform within the undergraduate science subject matter and education classes, prospective teachers' field based experiences, and professional development during new teachers induction years (NSF, 1993; NRC, 1997; Sunal, Wright, & Day, 2004).

Collaborating Partners

- Bowie State University Historically Black College/ University
- Hands On Science Outreach Inc. Informal Science Educational Program
- Prince George's County Public Schools Professional Development Schools (PDS)
- University of Maryland Research University, Very High

Model



Overarching Goal

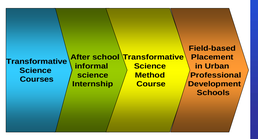
Develop and Test a New Teacher Preparation Continuum Model
for Upper Elementary / Middle School Science Teachers
With a Focus on the Recruitment and Preparation of Underrepresented Groups

⇩ Implementing the Model
⇩ Investigating the Model
⇩ Disseminating the Model

Objectives

- To build a new teacher preparation continuum model for upper elementary/middle school science teachers with an undergraduate academic minor in science content who can pass standardized exams in their content field.
- To implement this model at the University of Maryland, College Park and Bowie State University in partnership with Hands on Science Outreach,
- To increase the number of elementary teacher education majors who concentrate in science, particularly those typically underrepresented.
- To increase the number of qualified upper elementary/middle school science teachers, particularly those typically underrepresented.
- To evaluate the model's effectiveness.
- To conduct research on the model.
- To disseminate the model locally and nationally.

Implementing the Model



Undergraduate students in elementary education

Investigating

Year One: Focus 1: Undergraduate Advisors

To what level of success and for what reasons is it possible for undergraduate academic advisors to recruit undergraduate college students to be science specialist upper elementary/middle school teachers?

Participants: undergraduate advisors; Project Nexus leadership and representatives.

Method: individual and focus group interviews.

Investigating

Year One: Focus 2: Building up Baseline Data

Participants: recent graduates from the elementary education teacher preparation programs at UMD and BSU.

Method: online survey, "New Teachers Beliefs and Practices of Science."

Use: this baseline data will be used in Y5 of Project Nexus to compare the results of Project Nexus.

Investigating

Year Two: A Focus on Transformative Science Courses

To what level of success and for what reasons does participation in undergraduate science content courses that exemplify the use of an *inquiry perspective* affect the recruitment and preparation of teacher interns?

Investigating

Year Three: the Use of Informal Science Urban Field Placements

To what level of success and for what reasons do field-based placements in after school *informal science education programs* that serve adolescent students affect the recruitment (and preparation) of undergraduate students to science teaching?

Investigating

Year Four: A Focus on Science Methods Course & PDS Urban Placement

To what level of success and for what reasons participation in a *transformative science methods course* and a senior year *PDS placement* in an urban environment affect the recruitment (and preparation) of upper elementary/ middle school science teacher interns?

Investigating

Year Five: Induction Year in the Project Nexus Science Teacher Preparation Program

To what extent of success (and for what reasons) can undergraduate elementary teacher education majors be *recruited and prepared*

to teach upper elementary/ middle science in a manner consistent with *Standards*-based recommendations?

Disseminating the Model

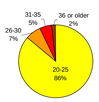
- College/ university seminars
- Professional association conferences
- Journal articles/ reports
- PDS interaction
- Website: www.projectnexus.umd.edu

Year One Findings

2005 graduates from the elementary education program

UMD (n=116)

Gender



Age

Race/Ethnicity

BSU (n=19)

Gender

Age

Race/Ethnicity

Survey for graduates

Online administration began:
01/15/2006

Hard copy follow up:
4/10/2006

Graduates from 2005:
UMD: n=116
BSU: n=19

Survey response goal:
60% (minimum)

Survey Response (as of 4/24/2006)
UMD: n=56 (48%)
BSU: n=8 (42%)

New Teachers Beliefs And Practices Of Science
Please think of your vision of science and of science teaching before you respond to the items.

SECTION II. To what extent do you agree or disagree with each of the following statements?
Choices: (A) Don't Know / No Opinion (B) Strongly disagree (C) Disagree (D) Agree (E) Strongly agree

1. Science is primarily a formal way of representing the real world.
2. Science is primarily a practical and structured guide for addressing real situations.
3. Some students have a natural talent for science and others do not.
4. A teacher's understanding of students is essential for teaching science effectively.
5. It is important for teachers to give students prescriptive and sequential directions for science experiments.
6. Focusing on rules is a bad idea. It gives students the impression that the sciences are a set of procedures to be memorized.
7. If students get into debates in class about ideas or procedures covering the sciences, it can harm their learning.
8. A teachers' understanding of students is not essential for teaching science effectively.
9. If students get into debates in class about ideas or procedures covering the sciences, it can benefit their learning.

SECTION III.
Choices: (A) Not at all (B) Slightly (C) Fairly (D) Moderately (E) Extremely

10. How important do you think it is for students to remember formulas and procedures?
11. How important do you think it is for students to think in sequential manner?
12. How important do you think it is for students to understand concepts?
13. How important do you think it is for students to be taught in a culturally response manner?
14. To do well in science at school, how important do you think it is for students to understand science use in the real world?
15. To do well in science at school, how important do you think it is for students to support their explanations/arguments with evidence?

SECTION IV.
Choices: (A) Not at all (B) Small extent (C) Fairly (D) Moderate extent (E) Great extent

16. What is your familiarity with the Science standards document *National Science Education Standards?*
17. What is your familiarity with the reform document *Benchmarks for Science Literacy?*

SECTION V. Instructional Practices
Note: Think of your vision of science and of science teaching. Then, respond to the items.
To what extent do you use the instructional strategies in science teaching that are listed below?
Choices: (A) Not at all (B) Small extent (C) Fairly (D) Moderate extent (E) Great extent

16. Assisting all students to achieve high standards.
18. Providing examples of high-standard work.
19. Using performance-based assessments.
20. Using standards aligned curricula.
21. Using standards-aligned textbooks and materials.
22. Using computer-supported instruction.
23. Making connections with mathematics.

SECTION VI. Brief Responses
Note: Please read the items and respond if they apply to your situation.

24. If you were at one time an undergraduate science major, what influenced you to pursue a career in teaching?
25. If you are a member of a traditionally underrepresented group in science, what influenced you to pursue a career in teaching?

Interviews conducted

1.MIMAUE (Maryland Institute for Minority Achievement & Urban Education)
n=5

2. Undergraduate advisors:
UMD: n=15
BSU: n=5 (anticipated)

3. Undergraduates:
UMD (TBD)
BSU (TBD)

Individual Interview: Undergraduate Advisors

Directions. Please respond to the following questions based on your experience advising undergraduate students.

1. For what reason(s) do undergraduate students in science (or those who have an interest in science) express an interest in teaching upper elementary/middle school science?
2. For what reason(s) do undergraduate students in science or those who have an interest in science do NOT express an interest in teaching upper elementary/middle school science?
3. What information or strategies have you found successful in communicating with minority undergraduate students concerning the possibility of learning how to teach upper elementary/middle school science?
4. What information or strategies have you found **NOT** successful in communicating with minority undergraduate students concerning the possibility of learning how to teach upper elementary/middle school science?