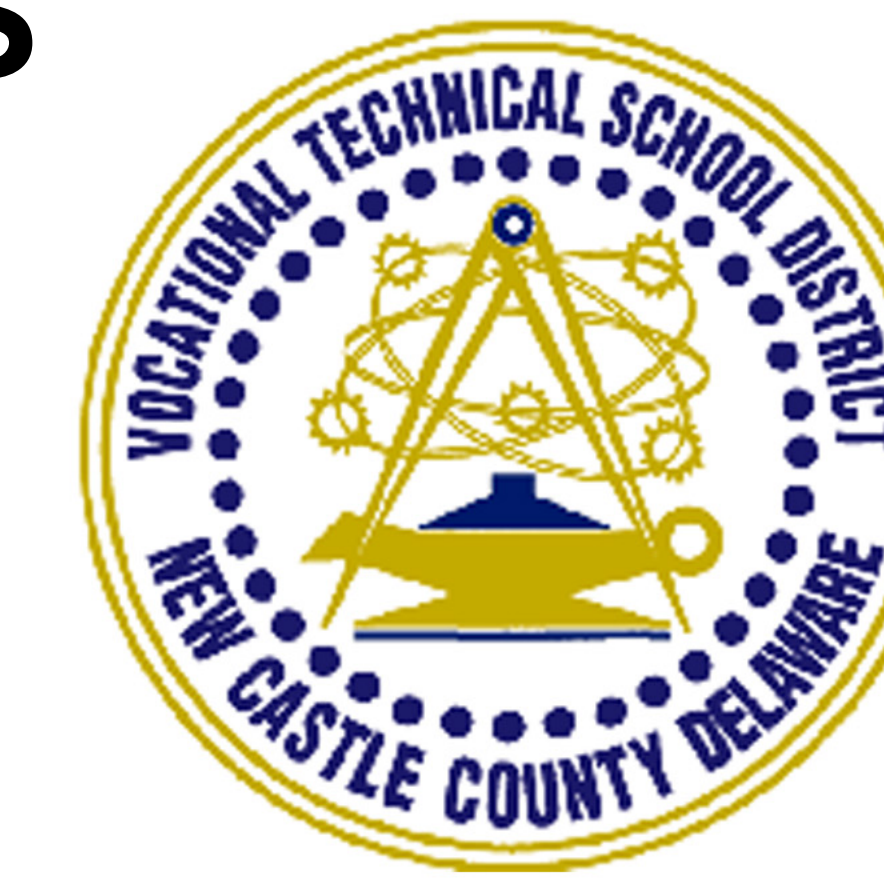


DELAWARE GK-12 PARTNERSHIP: IMPROVEMENT OF SCIENCE EDUCATION IN VOCATIONAL TECHNICAL HIGH SCHOOLS THROUGH COLLABORATIVE LEARNING AND COTEACHING

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Presenters: Anissa Brown (1), Carol Buswell (2), Michael Kittel (2), Ralph May (2), Katie Skalak (3),
P.I.'s: George Watson (4), Kate Scantlebury (5), Amy Quillen (6), Deborah Allen (1), Richard Donham (7) and John Madsen (3)

Abstract

The University of Delaware and the New Castle County Vocational Technical School District (NCCVT) have initiated a GK-12 partnership in which nine full-time UD graduate students in the sciences are selected annually to serve as Fellows. In the first year of this project, Fellows have been paired with high school science teachers from NCCVT. These pairs, along with the principal investigators (PIs) of this program, have formed a learning community focused on examining and reflecting on current issues in science education while specifically addressing critical needs in teaching science in vocational technical high schools.

During summer workshops and in follow-up meetings facilitated by the PIs, the Fellows have been introduced to a number of innovative teaching strategies including problem-based learning (PBL) and Coteaching. Fellow/teacher pairs have begun to develop and teach PBL activities that are in agreement with State of Delaware science standards and that support student learning through inquiry. Fellows also have engaged in Coteaching with their teacher partner. In this "teaching at the elbow of another", Fellows gain a better understanding of and appreciation for the complexities and nuances of teaching science in vocational-technical high schools.

As a result of their Delaware GK-12 activities, Fellows have enhanced the science classroom experience for high school students while simultaneously gaining insight for themselves into current issues of science education. Furthermore, Fellows have grown in their ability to communicate scientific understandings to an audience with multiple and diverse learning needs.

<http://www.udel.edu/GK-12/>

Fast Facts about NCCoVoTech District

- Number of Schools: 4
- Student Enrollment: 3,386 (49% female; 39% minority)
- % of Special Education Students: 14.8%
- Average Daily Attendance: 95.3% (State = 92.6%)
- Graduation Rate: 96.1% * (State = 83%)
- Employer satisfaction w/ students: 4.23 (out of 5)

Career Areas at Howard High School

Academy of Finance	Carpentry
Computer Network Administration	Cosmetology
Culinary Arts	Dental Assistant
Electrical Trades	TSS
Nurse Technicians	Public Service

- All students at NCCoVoTech take the full academic requirement needed to meet the requirements for a high school diploma.
- Students who meet the criteria also earn career program of study certificates.

- (1) Department of Biological Sciences, Univ of Delaware, Newark, DE, (2) Science Department, Howard High School, Wilmington, DE, (3) Department of Geological Sciences, Univ of Delaware, (4) Office of the Dean of the College of Arts and Sciences and Department of Physics and Astronomy, Univ of Delaware, (5) Department of Chemistry and Biochemistry, Univ of Delaware, (6) Instructional Services, New Castle County Vocational Technical School District, Wilmington, DE, (7) Mathematics and Science Education Resource Center, Univ of Delaware

Building teamwork while implementing the scientific process

Encouraging critical and independent thinking

Using visuals to model basic concepts of science

Assisting with laboratory set-up and student's questions

Developing relationships with students and creating a fun learning environment

2006-07 Graduate Fellows and Science Teachers

GK-12 Fellow

Anissa Brown
Biological Sciences

- Research on the cellular and molecular processes of cartilage formation
- Attributes much of her educational success to mentors and tutors and through involvement in the GK-12 program she will enable students to also have this opportunity.

GK-12 Teacher

Ingrid Anderson
Howard High School Of Technology

- Biological Sciences
- Partnering with GK-12 Fellow Rose O'Connor

GK-12 Fellow

Brian Danysh
Biological Sciences

- Research on the role of basement membranes on the development and function of the eye lens
- Prior to returning to Graduate School, he was an Assistant Vice President in the IT Department at MBNA, developed teaching "bug" answering questions at the Technology "Help Desk"

GK-12 Teacher

Carol Buswell
Howard High School Of Technology

- Integrated Sciences and Physical Sciences
- Partnering with GK-12 Fellow Katie Skalak

GK-12 Fellow

Genevieve Griffiths
Biological Sciences

- Research at the cellular level on mechanisms aiding mammalian reproduction
- Hopes to transfer her joy of discovery through scientific research to her students
- Teaching in the family - her mother has been a 4th grade teacher

GK-12 Teacher

Ronney Bythwood
Howard High School Of Technology

- Physics and Physical Sciences
- Partnering with GK-12 Fellow Tom Madura

Delaware GK-12 Benefits

- Expected outcomes include:
 - Improved communication, teaching, and team building skills for the Fellows;
 - Professional development opportunities for science teachers;
 - Enriched learning for the high school students; and
 - Strengthened partnership between University of Delaware and the New Castle County VoTech School District.

GK-12 Teacher

Brian Gross
Delcastle Technical High School

- Biological Sciences
- Partnering with GK-12 Fellows Brian Danysh and Genevieve Griffiths

GK-12 Fellow

Thomas Madura
Physics & Astronomy

- Research on the evolution of the η -Carinae stellar system
- As a graduate of Polytech High School in Kent County, he has an appreciation for what it takes in high school science courses to motivate and interest vocational students.

GK-12 Teacher

Brian Heeney
Delcastle Technical High School

- Biological Sciences
- Partnering with GK-12 Fellows Brian Danysh and Genevieve Griffiths

GK-12 Fellow

Marguerite McDonald
Chemistry & Biochemistry

- Research in biochemistry at the molecular level on the effect of certain enzymes on RNA
- Love of chemistry fostered by teachers and mentors sharing a passion for science
- Her goal is to combine her enthusiasm for science with her research experiences to inspire young citizens of Delaware.

GK-12 Teacher

Sharon Horrocks
Howard High School of Technology

- Special Education
- Partnering with GK-12 Fellow Fayth Miles

GK-12 Fellow

Fayth Miles
Biological Sciences

- Research on the growth of cancer cells
- NSF - Integrative Graduate Education, Research and Training (IGERT) Scholar
- Wants to work with high school teachers to increase interest and performance of minority students in the sciences

Project Evaluation

The planned evaluation includes external and internal activities. Dr. Jane Butler Kahle, Center for Mathematics and Science Education (E & A Center) in Ohio is the external evaluator.

Based on the goals of the project, the evaluation will be guided by the following questions:

- Do the project activities deepen and extend science content knowledge for fellows, teachers, and high school students?
- Do the project activities deepen and extend pedagogical knowledge for fellows and teachers?
- Do the project activities create learning communities?
- What elements of the program become institutionalized as a program partnering STEM graduate students and teachers to address critical issues in high school science education?

Multiple sources of quantitative and qualitative data will be gathered from fellows, faculty research advisors, cooperating teachers, and high school students. In addition, artifacts, including PBL and Lesson Study units, will be collected and used to address the evaluation questions. The external evaluation will also review reports conducted as part of internal evaluation activities.