

Annual Report for Period:09/2006 - 08/2007

Submitted on: 06/15/2007

Principal Investigator: Hailey, Christine .

Award ID: 0426421

Organization: Utah State University

Title:

National Center for Engineering and Technology Education

Project Participants

Senior Personnel

Name: Hailey, Christine

Worked for more than 160 Hours: Yes

Contribution to Project:

Christine Hailey was the PI and Director of NCETE. She was responsible for the overall management of the NCETE program. She worked closely with the other members of the Management Team to promote effective communication across the Center and to insure the work of the Center was accomplished in a timely fashion and was of high quality. She was the primary interface with the external evaluation team and the NSF program officer.

Name: Thomas, Maurice

Worked for more than 160 Hours: Yes

Contribution to Project:

Maurice Thomas was a Co-PI, USU Site Director and Technology Education Partner. His primary responsibilities were to coordinate the USU program of work, assist with the development of the Ph.D. core courses including detailed development of one of the core courses, recruit doctoral students, and to assist with the development of an engineering design challenge.

Name: Becker, Kurt

Worked for more than 160 Hours: Yes

Contribution to Project:

Kurt Becker was a Co-PI and Project Manager for NCETE. He was responsible for project administration and day-to-day operation of the NCETE effort, including facilities, reports and web presentations. Kurt worked closely with Christine Hailey, PI, to facilitate centeredness and overall project coordination. He helped facilitate the management team meetings (bi-weekly), face-to-face meetings with NCETE personnel (three meetings per year), and the summer workshop. Kurt also participated on the NCETE Management Team that was charged with oversight of the work of the Center to be certain tasks are accomplished.

Post-doc

Graduate Student

Name: Avery, Zanj

Worked for more than 160 Hours: Yes

Contribution to Project:

Zanj Avery was an NCETE Doctoral Fellow. He completed the second year of doctoral course work.

Name: Cox, Katrina

Worked for more than 160 Hours: Yes

Contribution to Project:

Katrina Cox was an NCETE Doctoral Fellow. She completed the second year of doctoral course work.

Name: Metzger, Nathan

Worked for more than 160 Hours: Yes

Contribution to Project:

Nathan Metzger was an NCETE Doctoral Fellow. He completed second year of doctoral course work core.

Name: Walrath, Douglas

Worked for more than 160 Hours: Yes

Contribution to Project:

Douglas Walrath was an NCETE Doctoral Fellow. He completed the second year of doctoral course work.

Undergraduate Student

Name: Briscoe, Ryan

Worked for more than 160 Hours: No

Contribution to Project:

Ryan Briscoe assisted Kurt Becker and Kristina Glaittli with graphical design for Center publications and with web page design and updates.

Technician, Programmer

Name: Glaittli, Kristina

Worked for more than 160 Hours: Yes

Contribution to Project:

Kristina Glaittli was an Associate Project Manager for NCETE. She assisted with project administration and day-to-day operation of the NCETE project.

Name: Gittens, Lynette

Worked for more than 160 Hours: Yes

Contribution to Project:

Lynette Gittens provided accounting support for NCETE.

Name: Hunt, Marsha

Worked for more than 160 Hours: Yes

Contribution to Project:

Marsha Hunt provided accounting support for NCETE.

Other Participant

Name: Fortenberry, Norman

Worked for more than 160 Hours: No

Contribution to Project:

Norman Fortenberry, Director of the Center for the Advancement of Scholarship on Engineering Education (CASEE) at the National Academy of Engineering, was a member of the NCETE Advisory Board.

Name: Martin, Gene

Worked for more than 160 Hours: No

Contribution to Project:

Gene Martin, Professor of Education in the Curriculum and Instruction Department at Texas State University, was a member of the NCETE Advisory Board.

Name: Cunningham, Christine

Worked for more than 160 Hours: No

Contribution to Project:

Christine Cunningham, Vice President of Research at the Boston Museum of Science, was a member of the NCETE Advisory Board.

Name: Wilson, Patricia

Worked for more than 160 Hours: No

Contribution to Project:

Patricia Wilson, Professor of Mathematics Education at the University of Georgia, was a member of the NCETE Advisory Board.

Name: Kolodner, Janet

Worked for more than 160 Hours: No

Contribution to Project:

Janet Kolodner, Professor of Computing and Cognitive Science at Georgia Institute of Technology, was a member of the NCETE Advisory Board.

Name: Robinson, Melvin

Worked for more than 160 Hours: No

Contribution to Project:

Melvin Robinson, State Supervisor of the Technology and Engineering in the Utah State Office of Education, was a member of the NCETE Advisory Board.

Name: Sayad, Treya

Worked for more than 160 Hours: Yes

Contribution to Project:

Treya Sayad worked closely with Kurt Becker, the NCETE project manager. She supported all NCETE initiatives.

Name: Bishop, A. Bruce

Worked for more than 160 Hours: Yes

Contribution to Project:

Bruce Bishop was Senior Personnel and an Engineering Partner for NCETE. His primary responsibilities were to help develop one of the core courses and to assist with the development of an engineering design challenge.

Name: Schreuders, Paul

Worked for more than 160 Hours: Yes

Contribution to Project:

Paul Schreuders was Senior Personnel and an Engineering Partner for NCETE. His primary responsibilities were to help develop one of the core courses and to assist with the development of an engineering design challenge.

Name: Dorward, James

Worked for more than 160 Hours: Yes

Contribution to Project:

James Dorward, Professor of Elementary Education, served as the internal evaluator for the program. His primary responsibilities were to evaluate the effectiveness of NCETE management structure, the core courses, and the professional development model.

Name: Thurgood, Jeff

Worked for more than 160 Hours: Yes

Contribution to Project:

Jeff Thurgood assisted Kurt Becker, the NCETE project manager, with graphical design for Center publications and with web page design and updates.

Name: Cyr, Martha

Worked for more than 160 Hours: No

Contribution to Project:

Martha Cyr, Director of K-12 Outreach at Worcester Polytech Institute, provided one day of consulting to help the NCETE Research Team refine the research framework. During the NCETE workshop, she also provided two days of consulting focused on engineering design.

Name: Benenson, Gary

Worked for more than 160 Hours: No

Contribution to Project:

Gary Benenson, Professor of Mechanical Engineering at City College of New York, provided one day of consulting to help the NCETE Research Team refine the research framework.

Name: Householder, Daniel

Worked for more than 160 Hours: Yes

Contribution to Project:

Daniel Householder provided 20 days of consulting. He also consulted with the NCETE PI via email and telephone. He attended the NCETE Fall Meeting, Advisory Board Meeting, Spring Meeting, and Summer Workshop.

Name: Reeve, Edward

Worked for more than 160 Hours: No

Contribution to Project:

Edward Reeve, Professor of Engineering and Technology Education, co-developed and team taught the fourth core course.

Name: Taylor, Timothy

Worked for more than 160 Hours: No

Contribution to Project:

Timothy Taylor, Principal Lecturer in Biological and Irrigation Engineering, co-developed and team taught the fourth core course.

Name: Ereksen, Thomas

Worked for more than 160 Hours: No

Contribution to Project:

Tom Ereksen, Dean of Business and Technology, Eastern Illinois University, served as a consultant to the Center.

Name: Moore, Tamara

Worked for more than 160 Hours: No

Contribution to Project:

Tamara Moore, University of Minnesota, served on a panel that discussed professional challenges faced by new university faculty members as they begin their careers as assistant professors as part of the Third Annual NCETE Summer Workshop.

Name: Varnado, Terri

Worked for more than 160 Hours: No

Contribution to Project:

Terri Varnado, North Carolina State University, served on a panel that discussed professional challenges faced by new university faculty members as they begin their careers as assistant professors as part of the Third Annual NCETE Summer Workshop.

Name: Dischino, Michele

Worked for more than 160 Hours: No

Contribution to Project:

Michele Dischino, Central Connecticut State University, served on a panel that discussed professional challenges faced by new university faculty members as they begin their careers as assistant professors as part of the Third Annual NCETE Summer Workshop.

Research Experience for Undergraduates

Organizational Partners

University of Minnesota-Twin Cities

Participant name: Theodore Lewis

Project role: Other Senior Personnel

160 hours: Yes

Description of involvement: Theodore Lewis was the UMN PI and Site Director, and a Technology Education Partner. Primary responsibilities were to coordinate the UMN program of work, recruit doctoral students, develop one of the core courses for the Ph.D. fellows, and assist with the development of an engineering design challenge. He also attended and participated in local and national level meetings. Ted was a member of the NCETE research team.

Participant name: Karl Smith

Project role: Other Senior Personnel

160 hours: Yes

Description of involvement: Karl Smith was the UMN Co-PI and an Engineering Partner. He assisted Ted Lewis with development of the core course and the engineering design challenge. He also attended and participated in local and national level meetings. Karl was a member of the NCETE research team.

Participant name: Randy Knapp

Project role: Doctoral Student

160 hours: Yes

Description of involvement: Randy Knapp was an NCETE Doctoral Fellow. He completed the first year of doctoral course work including the first two NCETE core courses.

Participant name: Wendy Knapp

Project role: Doctoral Student

160 hours: Yes

Description of involvement: Wendy Knapp was an NCETE Doctoral Fellow. She completed the first year of doctoral course work including the first two NCETE core courses

Participant name: David Stricker

Project role: Doctoral Student

160 hours: Yes

Description of involvement: David Stricker was an NCETE Doctoral Fellow. He completed the first two years of doctoral course work.

Participant name: Ben Franske

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Ben Franske had a 50% time appointment this year and will be a fellow in the incoming cohort. He completed two NCETE core courses.

Participant name: Mike Nehring

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Mike Nehring received tuition support for the year.

Participant name: Mauvalyn Bowen

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Mauvalyn Bowen was administrative assistant to Co-PI Lewis, in support of NCETE activities. She received 20 hours per week of support.

Participant Name: Mike Shrode

Project Role: Doctoral Student

160 hours: Yes

Description of Activities: Mike Shrode attended for one semester, and completed one core NCETE course.

Participant Name: Chandra Austin

Project Role: Graduate Student

160 hours: No

Description of Activities: Chandra Austin completed her MS degree, and attended NCETE activities.

University of Wisconsin - Stout

Participant name: Brian McAlister

Project role: Other Senior personnel

160 hours: Yes

Description of involvement: Brian McAlister was the UW-Stout PI and a Technology Education Partner. Brian McAlister, along with Kenneth Welty, brought closure to the UW-Stout professional development in-service delivery, hosted the fall NCETE meeting, and participated in local and national level meetings. He was a member of the NCETE research team, the Leadership Development Team and the Professional Development Team.

Participant name: Kenneth Welty

Project role: Other Senior personnel

160 hours: Yes

Description of involvement: Kenneth Welty was the UW-Stout Co-PI and Site Director. Ken Welty, along with Brian McAlister, brought

closure to the UW-Stout professional development in-service delivery, hosted the fall NCETE meeting, and participated in local and national level meetings. He provided leadership for an NCETE, National Academy of Engineering collaborative Landscape study.

Participant name: Cathy Durski

Project role: Graduate Student

160 hours: Yes

Description of involvement: Cathy Durski, Graduate Research Assistant, worked in the UW-Stout/NCETE booth at Wisconsin Technology Education Conference, and summarized research data on the effectiveness of UW-Stout professional development activities during year 2.

Participant name: Mike Nehring

Project role: Graduate Student

160 hours: Yes

Description of involvement: Mike Nehring, Graduate Research Assistant, assisted in the preparation of teacher in-service workshop, worked in the UW-Stout/NCETE booth at Wisconsin Technology Education Conference, represented UW-Stout at the NCETE meeting at UW-Stout and San Antonio, and conducted research on the effectiveness of the year 2 UW-Stout professional development activities.

Participant name: Leah Roue

Project role: Graduate Student

160 hours: No

Description of involvement: Leah Roue, Graduate Student, completed an NCETE funded study on middle school females' perceptions of engineering.

Participant name: Gregg Slupe

Project role: Graduate Assistant

160 hours: Yes

Description of involvement: Gregg Slupe, Graduate Research Assistant, created curriculum and workshop materials for the implementation of the lean manufacturing design challenge.

Participant name: Jeff Sullivan

Project role: Graduate Assistant

160 hours: Yes

Description of involvement: Jeff Sullivan, Graduate Research Assistant, created curriculum and workshop materials for the implementation of the lean manufacturing design challenge.

Participant name: Richard Rothaupt

Project role: Other Senior Personnel

160 hours: No

Description of involvement: Richard Rothaupt was Senior Personnel and an Engineering Partner. He met with Brian McAlister and Kenneth Welty to help clarify the basic concepts and skills associated with production tooling. He also assisted with professional development by presenting an overview of the concepts, materials, hardware and techniques used to design and build jigs, fixtures, gauges and templates.

Participant name: Tom Lacksonen

Project role: Other Senior Personnel

160 hours: No

Description of involvement: Tom Lacksonen was Senior Personnel and an Engineering Partner. He assisted with professional development by presenting an overview of statistical applications in industrial and manufacturing engineering (e.g. time motion, quality assurance, line balancing, etc.)

Participant name: Ken Nueberg

Project role: Other Senior Personnel

160 hours: No

Description of involvement: Ken Nueberg was Senior Personnel and an Engineering Partner. He met with Brian McAlister and Kenneth Welty to discuss the nature of packaging engineering, the relationship between packaging engineering, and other areas of engineering and the role it plays in the context of manufacturing engineering. He assisted with professional development by presenting an overview of the kinds of work packaging engineers do.

Participant name: Diane Olson

Project role: Other Senior Personnel

160 hours: No

Description of involvement: Diane Olson was Senior Personnel and an Engineering Partner. She met with Brian McAlister and Kenneth Welty to discuss the role of statistical process and quality control techniques play in manufacturing engineering. She assisted with professional development by consulting on how statistical process and quality control are implemented in manufacturing engineering.

Participant name: Barbara Nicol

Project role: Other Senior Personnel

160 hours: No

Description of involvement: Barbara Nicol was Senior Personnel and an Engineering Partner. She met with Brian McAlister and Kenneth Welty to discuss the essential elements of lean manufacturing and how they are implemented in local industries. She assisted with professional development by presenting the basic concepts associated with lean manufacturing using examples that can be replicated with high school students.

University of Illinois, Urbana/Champaign

Participant name: Scott D. Johnson

Project Role: Other Senior Personnel

160 hours: Yes

Description of involvement: Scott Johnson was the UIUC PI and Site Director, and the NCETE Research Director. Primary responsibilities were to coordinate the UIUC program of work, support the research and academic program of the UIUC fellows, and conduct an analysis of the published research in engineering and technology education. As NCETE Research Director, he coordinated and managed the NCETE research activities. He also participated on the NCETE Management Team that was charged with oversight of the work of the Center to be certain tasks were accomplished.

Participant name: Ty Newell

Project Role: Other Senior Personnel

160 hours: No

Description of involvement: Ty Newell was Senior Personnel and an Engineering Partner. His primary responsibilities were to assist UIUC fellows on their research projects and support the ISU professional development workshops. He co-hosted and made a presentation at the May 2007 workshop.

Participant name: Jenny Daugherty

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Jenny Daugherty was an NCETE Doctoral Fellow. She completed the second year of doctoral course work including the last two NCETE core courses.

Participant name: Martin Westrick

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Martin Westrick was an NCETE Doctoral Fellow. He completed the second year of doctoral course work including the last two NCETE core courses.

Participant name: Yong Zeng

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Yong Zeng was an NCETE Doctoral Fellow. He completed the second year of doctoral course work including the last two NCETE core courses.

Brigham Young University

Participant name: Ronald Terry

Project role: Other Senior Personnel

160 Hours: Yes

Description of involvement: Ronald Terry was the BYU Co-PI, co-site director and Engineering Partner. He was a participant in planning and delivering professional development for K-12 in-service teachers and attended and participated in local and national meetings. He also served

as a member of the NCETE Research Committee.

Participant name: Steven Shumway
Project role: Other Senior Personnel
160 Hours: Yes

Description of involvement: Steven Shumway was BYU Co-PI, co-site director and a Technology Education Partner. He was a participant in planning and delivering professional development for K-12 in-service teachers and attended and participated in local and national meetings.

Participant name: Jared Berrett
Project role: Consultant
160 Hours: No

Description of involvement: Jared Berrett was a Technology Education Partner for the first two years of the project. He has since moved to a high school where he teaches pre-engineering courses and conducts research related to teaching pre-engineering. He also participated in a publication and presentation at the 2007 ASEE Conference.

Participant name: Kari Cook
Project role: Graduate Student
160 Hours: Yes

Description of involvement: Kari Cook was a chemical engineering graduate that is currently a TTE graduate student. Kari conducts research focused on women in technical and engineering professions and has helped plan NCETE activities.

California State University-Los Angeles

Participant name: Don Maurizio
Project role: Other Senior Personnel
160 hours: Yes

Description of involvement: Don Maurizio was the CSULA PI and Site Director, and a Technology Education Partner. He was responsible for the administration and day-to-day operation of the CSULA effort, including facilities, supplies, paperwork (including hiring of all participants) and campus coordination. Don was part of the three-person team that conceptualized, developed, organized and delivered the Engineering Design workshop series for the Cal-State-Los-Angeles-based cohort of high school teachers. He was responsible for the coordination with the partner K-12 school district (Long Beach Unified) and the recruiting of the workshop program participants from the high schools in the district. Don added the Montebellos USD for the second year cohort. Based on the new directives from NSF, Don led the redesign of the professional development model on behalf of CSULA. Most of this work was done collaboratively with the other four teacher education sites.

Participant name: Ethan B. Lipton
Project role: Other Senior Personnel
160 hours: Yes

Description of involvement: Ethan Lipton was a CSULA Co-PI and Technology Education Partner. He was part of the three-person team that conceptualized, developed, organized and delivered the Engineering Design workshop series for the Cal-State-Los-Angeles-based cohort of high school teachers. The participants were from various high schools within the Long Beach Unified School District. He was responsible for the identification and recruitment of the two main faculty consultants on the project. These faculty consultants prepared and delivered instruction on foundational mathematics and physics material. Ethan also provided all of the graphical design for the project. He also conducted a variety of research efforts required to support the workshop series, the engineering design challenge, and the overall mission of the Center. He also coordinated and participated in a broad dissemination effort that included papers and presentations.

Participant name: Mark Tufenkjian
Project role: Other Senior Personnel
160 hours: Yes

Description of involvement: Mark Tufenkjian was a CSULA Co-PI and Engineering Partner. He was one of the three-person team that conceptualized, developed, organized and delivered the Engineering Design workshop series for the Cal-State-Los-Angeles-based cohort of high school teachers. As the only engineering professor on the project, Mark has provided meaningful insight into the engineering profession. He has defined what the participants must know and be able to do in order to infuse engineering education into their high school programs. He also developed the earthquake design project for the Engineering Design Challenge prepared by CSULA. Mark has worked collaboratively with Ethan Lipton to write papers and make presentations. He has also worked with Don Maurizio to redesign the professional development program and make it more research based.

Participant name: Mauricio Castillo
 Project role: Other Senior Personnel
 160 hours: Yes

Description of involvement: Mauricio Castillo conducted research on individual aspects of engineering education at the high school level, and on effective techniques for the professional development of high school teachers. As a new member of our senior personnel, he has participated in the redesign of the professional development model. He has also formed new connections to the Los Angeles Unified School District that have the potential to lead to new partners for our center.

Participant name: Sharri Kornblum
 Project role: Other Senior Personnel
 160 hours: Yes

Description of involvement: Sharri Kornblum, Professor of Mathematics, was Senior Personnel. Her specialties were the diagnosis and remediation of mathematics skills. She diagnosed the mathematics skill levels of the participants using a standardized instrument administered by UCLA. She then developed and delivered a program of instruction preparing the participants with the mathematics abilities needed to understand and teach the mathematics required for the program.

Participant name: William Taylor
 Project role: Other Senior Personnel
 160 hours: Yes

Description of involvement: William Taylor, Professor of Physics, was Senior Personnel. His specialty was the interactive demonstration of physics principals. He provided an overview of physics principles using a variety of demonstration devices. Dr. Taylor developed and delivered all of the foundational physics instruction to the participants over a series of workshops.

Illinois State University

Participants name: Rodney L. Custer
 Project Role: Other Senior Personnel
 160 hours: Yes

Description of involvement: Rodney Custer was the ISU PI and a member of the NCETE management team. He participated in local professional development in-service planning and delivery, and attended and participated in local and national level meetings. As NCETE Director of Technology Teacher Education, he coordinated the pre-service teacher education programs, the professional development programs, and the engineering design challenges. He also participated on the NCETE Management Team that was charged with oversight of the work of the Center to be certain tasks are accomplished.

Participant name: Chris P. Merrill
 Project Role: Other Senior Personnel
 160 hours: Yes

Description of involvement: Chris Merrill was an ISU Co-PI and Technology Education Partner. He led the ISU professional development in-service planning and delivery, and attended and participated in local and national level meetings. Merrill was charged with directing the professional development for NCETE in January of 2007. Both Custer and Merrill were Co-PIs on an internal NCETE funded project focusing on delivering key engineering concepts at the secondary level.

Participant name: Britton Devier
 Project Role: Graduate Student
 160 hours: Yes

Description of involvement: Britton provided support for Illinois teacher professional development research, and training.

Participant name: Katrina Hockin
 Project Role: Graduate Student
 160 hours: No

Description of involvement: Katrina Hockin provided support for Illinois teacher professional development research, and training.

Participant name: Dan Wixted
 Project Role: Graduate Student
 160 hours: Yes

Description of involvement: Dan Wixted provided support for Illinois teacher professional development, research, and training.

North Carolina A & T State University

Participant name: Vincent Childress

Project role: Other Senior Personnel

160 hours: Yes

Description of involvement: Vincent Childress was the NCA&T PI and Site Director, and a Technology Education Partner. He administered NCETE activities on the campus of NC A&T, which has included finding and purchasing all professional development supplies and resources, collecting data on professional development participants, recruiting participants, developing primary professional development instructional materials and lab activities, hiring and supervising graduate research assistants and a faculty consultant, and coordinating research and development efforts. Vince helped design and deliver the professional development activities, including developing instructional materials and helping public school teacher participants understand lab activities and concepts during the professional development. He is currently studying the implementation of PD in the classroom. He recently participated in the redesign of PD based on feedback on PD at the A&T site, what was learned at the PD Symposium, and what was learned from the internal and external evaluators. Vince also helped lead the development of a study to identify appropriate student outcomes for technology education programs that have the goal of teaching technological literacy while using engineering design and analytical and predictive processes as a vehicle for instruction. He and Mark Sanders from Virginia Tech delivered a paper on the subject at the recent PD Symposium in Dallas, Texas.

Participant name: Ali Abul-Fadl

Project role: Other Senior Personnel

160 hours: Yes

Description of involvement: Ali Abul-Fadl was an NCA&T Co-PI and Engineering Partner. He helped design and deliver professional development activities, including developing instructional materials and helping public school teacher participants understand lab activities and concepts during the professional development. Ali is helping in the redesign of PD based on his expertise as an engineer. Ali also assisted with the development of a study to identify appropriate student outcomes for technology education programs that have the goal of teaching technological literacy while using engineering design and analytical and predictive processes as a vehicle for instruction.

Participant name: Craig Rhodes

Project role: Other Senior Personnel

160 hours: Yes

Description of involvement: Craig Rhodes was an NCA&T Co-PI and Technology Education Partner. He helped design and deliver the professional development activities, including developing instructional materials and helping public school teacher participants understand lab activities and concepts during the professional development. Craig has also helped develop study to identify appropriate student outcomes for technology education programs that have the goal of teaching technological literacy while using engineering design and analytical and predictive processes as a vehicle for instruction. Craig worked closely with Don Maurizio, CSULA, in recruiting fellows to the participating Ph.D. granting institutions. One of his focuses in this effort was identifying minority and women recruits. Craig is redesigning PD implementation follow-up and evaluation for years four and five.

Participant name: Barbara Tankersley

Project role: Other Senior Personnel

160 hours: Yes

Description of involvement: Barbara Tankersley, mathematics consultant, developed supplemental mathematics instruction for the professional development effort and has assisted teacher professional development participants in understanding and applying mathematical concepts.

Participant name: Maurice Marshall

Project role: Graduate Student

160 hours: Yes

Description of involvement: Maurice Marshall was a Graduate Research Assistant and assisted in all efforts in NCETE project including but not limited to conducting research, developing and delivering professional development, and clerical work.

Participant name: Thaddeus Pryor

Project role: Graduate Student

160 hours: Yes

Description of involvement: Thaddeus Pryor was a Graduate Research Assistant and assisted in all efforts in NCETE project including but not limited to conducting research, developing and delivering professional development, and clerical work.

Participant name: Thaddeus Lamb

Project role: Graduate Student

160 hours: Yes

Description of involvement: Thaddeus Lamb was a Graduate Research Assistant and assisted in all efforts in NCETE project including but not limited to conducting research, developing and delivering professional development, and clerical work.

University of Georgia

Participant name: Robert Wicklein

Project Role: Other Senior Personnel

160 hours: Yes

Description of involvement: Robert Wicklein was the UGA PI and Site Director and the NCETE Director of Graduate programs. He coordinated the UGA program of work. As NCETE Director of Graduate Programs he coordinated and facilitated PhD recruitment & selection, core course syllabus planning, and presentation planning. He also participated on the NCETE Management Team that was charged with oversight of the work of the Center to be certain tasks are accomplished.

Participant name: David Gattie

Project Role: Other Senior Personnel

160 hours: Yes

Description of involvement: David Gattie was Senior Personnel and an Engineering Partner. He developed specific engineering details of course syllabi (core course and seminars), as well as the development of conference and workshop presentations. He also assisted with planning for the UGA engineering design challenge.

Participant name: Sidney Thompson

Project Role: Other Senior Personnel

160 hours: Yes

Description of involvement: Sidney Thompson was Senior Personnel and an Engineering Partner. He co-developed specific engineering details of course syllabi (core course and seminars), as well as the development of conference and workshop presentations. He also assisted with planning for the UGA engineering design challenge.

Participant name: Roger Hill

Project Role: Other Senior Personnel

160 hours: Yes

Description of involvement: Roger Hill was Senior Personnel and a member of the NCETE management team. He reviewed and contributed to core course development, presentations, and co-developed the NCETE Website.

Participant name: Nadia Kellam

Project Role: Other Senior Personnel

160 hours: Yes

Description of involvement: Nadia Kellam was Senior Personnel and an Engineering Partner. She co-developed specific engineering details of course syllabi (core course and seminars), as well as the development of conference and workshop presentations. She also assisted with presenting on a panel of new professors to the NCETE May Workshop in Illinois.

Participant name: Cameron Denson

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Cameron Denson was an NCETE Doctoral Fellow. He completed the second year of doctoral course work including all four NCETE core courses.

Participant name: Todd Kelley

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Todd Kelley was an NCETE Doctoral Fellow. He completed the second year of doctoral course work including all four NCETE core courses.

Participant name: Paul Asunda

Project Role: Doctoral Student

160 hours: Yes

Description of involvement: Paul Asunda received NCETE funding to conduct research on the curriculum characteristics needed to introduce engineering design into secondary level technology education programs.

Other Collaborators or Contacts

Organization name: International Technology Education Association (ITEA)

Partner's contribution: ITEA assisted NCETE with dissemination and helped establish connections with other individuals and organizations involved in technology and engineering education in grades K-12. ITEA invited NCETE to submit an article to their publication 'The Technology Teacher' and published NCETE activities in their electronic newsletter 'Trend Scout.' ITEA provided time for two sessions at the annual conference for NCETE-related presentations.

Organization name: Council on Technology Teacher Education (CTTE)

Partner's contribution: CTTE is affiliated with ITEA and focuses on technology teacher education. One important role of CTTE is the publication of an annual yearbook that communicates educational material without duplicating commercial textbook activities. A proposal has been developed and accepted by CTTE to develop a yearbook on Engineering and Technology Education.

Organization name: American Society for Engineering Education (ASEE)

Partner's contribution: ASEE assisted NCETE with dissemination and helped establish connections with other individuals and organizations involved in engineering education in grades K-12. NCETE team members participated in ASEE K-12 Division meetings which helped frame the research directions for engineering education in K-12.

Organization name: Center for the Advancement of Scholarship on Engineering Education (CASEE)

Partner's contribution: CASEE is part of the National Academy Engineering and has many well-recognized partners in engineering education. CASEE's goals are similar to NCETE's and that is to improve engineering education at the pre-college, undergraduate, graduate and continuing education levels. NCETE has been accepted as a CASEE Research Affiliate.

Organization name: Brigham Young University High School Partners: Jordan School District, Jordan, UT; Davis School District, Centerville, UT; Wasatch School District, Heber City, UT; Beaver School District, Milford, UT; Washington County School District, St. George, UT; Tooele School District, Wendover, UT.

Partner's contribution: Provided teacher release time so that teachers could participate in professional development and have committed to infusing engineering concepts into K-12 schools. The purpose of establishing this partnership was to identify and support teachers' participation in professional development designed to improve knowledge and skills related to infusing engineering concepts into K-12 schools.

Organization name: California State University, Los Angeles High School Partners: Long Beach Unified School District, CA.

Partner's contribution: Provided the teachers for the project. Provided the coordination, teacher identification and selection, and district project oversight by Mr. Matt Saldana, District Director of Technology Education. Has agreed to provide the sites (at two high schools in the district) for two fall follow-up meetings, where the participants will share their initial experiences in the classroom. Provided the teachers for the Summer 2007 test and research for the new professional development model. The purpose of establishing this partnership was to identify a cohort of teachers that would represent 'integration teams' at the various Long Beach high schools. These integration teams consist of a technology teacher (as the team leader), a math teacher, and a science teacher. The long-term goal for each high school could extend to academies, magnet schools, and other focused programs. This district has agreed to continue to participate until all of their high schools have programs in place. They have also agreed to look beyond the project by participating in research and teacher recruitment initiatives.

Organization name: California State University, Long Beach High School Partner: Montebello Unified School District, CA.

Partner's contribution: Provided teachers for the project. Provided the coordination, teacher identification and selection, and district project oversight by Mr. William Whitmore. The Montebello Unified School district has created a district-wide engineering academy as a spin-off of the initial training from the Center. Faculty from CSULA sit on the advisory board for the new academy program in the district.

Organization name: Illinois State University High School Partners: Normal Community West High School, Normal, IL; Bloomington Area Vocational Center, Bloomington, IL; St. Charles North High School, St. Charles, IL; Wheeling High School, Wheeling, IL; University High School, Normal, IL; East Aurora High School, Aurora, IL; Evanston High School, Evanston, IL; Willowbrook High School, Villa Park, IL. Partner's contribution: Teachers from these schools engaged in professional development. Teachers from a number of these schools were also involved with the NCETE study conducted by Custer and Merrill on delivering core engineering concepts to secondary level students.

Organization name: North Carolina A&T State University High School Partner: Alamance-Burlington Schools, NC; Guilford County Schools, NC; Winston-Salem/Forsyth County Schools, NC; Stokes County Schools, NC.

Partner's contribution: Provided paid teacher release time so that teachers could participate in professional development. The purpose of establishing these partnerships was to more deliberately identify and support teachers to participate in professional development and gain access to teachers and students as the subjects of research. A number of these partnership directly benefit the students of the school system, a significant portion of who are on free or reduced lunch.

Organization name: University of Wisconsin-Stout High School Partners: Eau Claire North High School, WI; Brillion High School, WI; Wausau West High School, WI; Oregon High School, WI; Spring Valley High School, WI; West Bend High School, WI; Reedsburg High School, WI; Plymouth High School, WI.

Partner's contribution: Released technology teachers for professional development activities. Integrated units of instruction that target selected national standards as well as pre-engineering concepts and skill into existing curriculum. Hosted a student teacher that worked with a mentor to deliver pre-engineering content. Supported inquiry that will inform teaching and learning in technology education, especially how students learn concepts and skills that are related to the study of engineering.

Organization name: Ariens Corporation

Partner's contribution: Jeff Hubbard, the Vice President of Consumer and Commercial Ride on Products for Ariens delivered the keynote presentation regarding lean manufacturing and its implication on technology and engineering education at the UW-Stout Technology Education Conference/NCETE fall meeting.

Activities and Findings

Research and Education Activities: (See PDF version submitted by PI at the end of the report)

Findings: (See PDF version submitted by PI at the end of the report)

Training and Development:

Training and Development Opportunities: 2006-07

Professional development to strengthen the NCETE faculty and doctoral student understanding of research and engineering design occurs at summer workshops. The third annual NCETE summer workshop was hosted by UIUC and ISU on May 16 -18. Center faculty, doctoral students and an Advisory Board member attended the meeting. Linda Katehi, Provost of UIUC and former Dean of the College of Engineering at Purdue, provided an opening session where she highlighted issues in engineering education. Mary Kalantzis, Dean of Education at UIUC, provided remarks on contemporary issues in education. Ty Newell, Assistant Dean in the College of Engineering at UIUC, discussed engineering disciplines, fields, and careers and introduced a unique example of engineering optimization in the design of a solar house. Details about the Solar House Design Competition project at UIUC helped contextualize engineering optimization and design as well as the role of systems engineering. A panel of classroom teachers described their experiences in infusing engineering design into the classroom to help connect Center research with practice. The doctoral fellows developed the workshop activities for the morning of May 18 which consisted of a series of formal debates on three topics: The Role of Engineering in Education, Operational Perspectives on Integrating Engineering into the Classroom, and Psychological Foundations for Engineering Design. For each of the topics, one of the fellows provided formal comments on one position. Another fellow provided comments on the opposing position and each had an opportunity for rebuttal. The Fellows also sponsored a panel discussion of the professional challenges faced by new university faculty members as they begin their careers as assistant professors in engineering and technology education. During the afternoon of May 18, the Center sponsored a Research Symposium. The symposium program consisted of Fellows and faculty members reporting on the findings of the six exploratory studies funded during the first year of Center operation. Following the presentations, a team of fellows and consultants provided critiques of the research and reports.

During the first two years, an NCETE goal was to address the CLT solicitation component of 'enhancing the content knowledge and pedagogical skills of current and future teachers.' The Center conducted professional development at five teacher education sites focusing on developing teacher leaders who had an understanding of high-school level engineering design. At each site, a team of technology educators and engineers worked with a small number of technology education teachers. Several institutions also involved pre-service teachers in their professional development summer workshops. At the end of year two, the Center had worked with 115 teachers, of whom 21% were female and 15% represented ethnic minorities.

Outreach Activities:

Journal Publications

Hailey, C., Ereksion, T., Becker, K., & Thomas, M., "National center for engineering and technology education", *The Technology Teacher*, p. 23-26, vol. 64 (5), (2005). Published

Lewis, T., "Coming to terms with engineering design as content", *Journal of Technology Education*, p. 34-51, vol. 16(2), (2005). Published

Lewis, T., "Design and inquiry: bases for an accommodation between science and technology education in the curriculum?", *Journal of Research in Science Teaching*, p. 255, vol. 43(3), (2006). Accepted

Lewis, T., "Creativity: a framework for the design/problem solving discourse in technology education", *Journal of Technology Education*, p. 36, vol. 17(1), (2006). Published

Wicklein, R., "5 Good reasons for engineering as the focus for technology education", *The Technology Teacher*, p. 25, vol. 65(7), (2006). Published

Childress, V.W., and Rhodes, C., "Engineering outcomes for grades 9-12", *The Technology Teacher*, p. , vol. , (). Accepted

Lewis, T., "Engineering education in the schools", *International Journal of Engineering Education*, p. , vol. , (). Accepted

Books or Other One-time Publications

Ereksion, T.L. & Thomas, M., "Infusing engineering into technology education.", (2005). Conference Presentation, Published
Bibliography: ITEA Conference Kansas City, MO.

Ereksion, T. L., Hailey, C., Becker, K., & Thomas, M., "National center for engineering and technology education.", (2005). Conference Presentation, Published
Bibliography: International Technology Association Conference, Kansas City, MO.

Hailey, C., Becker, K., Thomas, M. and Ereksion, T., "The national center for engineering and technology education.", (2005). Conference Proceeding, Published
Bibliography: 2005 American Society for Engineering Education Annual Conference and Exposition, Portland, OR.

Gattie, D. and Wicklein, R., "Curricular value and instructional needs for infusing engineering design into k-12 technology education.", (2005). Conference Proceeding, Published
Bibliography: 2005 American Society for Engineering Education Annual Conference and Exposition, Portland, OR.

Becker, K. & Custer, R., "Work in progress - The national center for engineering and technology education: supporting teacher professional development and reviewing K-12 schooling.", (2005). Conference Proceeding, Published
Bibliography: Frontiers in Education, Indianapolis, IL

Merrill, C., Childress, V., Rhodes, C., and Custer, R., "Infusing engineering concepts into technology education.", (2006). Conference

Proceeding, Published

Bibliography: 2006 American Society for Engineering Education Annual Conference and Exposition, Chicago, IL

Becker, K., "Supporting K-12 teacher professional development through the national center for engineering and technology education.", (2006). Conference Proceeding, Published

Bibliography: 2006 American Society for Engineering Education Annual Conference and Exposition

Custer, R. & Erikson, T., Eds., "Engineering and technology education.", (2008). Book, Accepted

Bibliography: CTTE Yearbook, Peoria, IL: Mission Hills, CA: Glencoe/McGraw-Hill Publishers.

Childress, V. W., & Sanders, M., "Core engineering concepts for K-12 technology education.", (2007). Conference Proceeding, Published

Bibliography: Professional Development Symposium for Engineering and Technology Education, February 12, 2007, Dallas, TX.

Tufenkjian, M., & Lipton, E. B., "A professional development model to infuse engineering design content into the high school curriculum.", (2007). Conference Proceeding, Published

Bibliography: 2007 Annual American Society for Engineering Education Conference and Exposition, Honolulu, Hawaii, June 24-27.

Lipton, E. B., Tufenkjian, M., & Maurizio, D., "Quake ed: Involving high school technology students in engineering design.", (2007). Book, Published

Bibliography: California Industrial and Technology Education Association Annual Conference. Fresno, California.

Tufenkjian, M., Maurizio, D. & Lipton, E. B., "Quake ed: An instructional module to demonstrate earthquake engineering principles to high school students.", (2006). Conference Proceeding, Published

Bibliography: 8th U.S. National Conference on Earthquake Engineering, San Francisco, California.

Welty, K.D., Merrill, C., Hill, R., & Shumway, S., "Integrating engineering into technology teacher education.", (2007). Conference Presentation, Published

Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Kelley, T., and Denson, C., "Creative engineering activities for elementary (Grades 4-6).", (2007). Conference Presentation, Published

Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Denson, C., Avery, Z., and Hill, R., "African American students: Perceptions of technical careers.", (2007). Conference Presentation, Published

Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Wicklein, R. and Kelley, T., "Making engineering work at your school.", (2007). Conference Presentation, Published

Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Childress, V., and Rhodes, C., "Engineering outcomes for high school: Follow-up.", (2007). Conference Presentation, Published

Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Merrill, C., Custer, R., Daugherty, J., Westrick, M., & Zeng, Y., "Delivering core engineering concepts to secondary level students.", (2007). Conference Proceeding, Published

Bibliography: 2007 Annual American Society for Engineering Education Conference and Exposition, Honolulu, Hawaii, June 24-27.

Merrill, C., "Technology education and STEM: Yes, no, maybe, I don't care.", (2007). Conference Presentation, Published

Bibliography: Presentation at the 93rd Annual Mississippi Valley Technology Teacher Education Conference, Nashville, Tennessee

Merrill, C., "Engineering-related curricular resources for technology education.", (2006). Conference Presentation, Published

Bibliography: 53rd Annual University of Wisconsin-Stout Technology Education Conference, Menomonie, Wisconsin

Merrill, C., "Professional development and curricular resources: An engineering and technology education partnership.", (2006). Conference Presentation, Published

Bibliography: 53rd Annual University of Wisconsin-Stout Technology Education Conference, Menomonie, Wisconsin

Merrill, C., "Virtual manufacturing project: Engineering and technology education.", (2006). Conference Presentation, Published
Bibliography: Annual Connections Conference, Springfield, Illinois

Daugherty, J., Zeng, Y., Westrick, M., Merrill, C. & Custer, R., "Delivering key engineering concepts using the STL.", (2007). Conference Presentation, Published
Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas.

Kellam N., Gattie D. K., Navarro M., "A systems approach to teaching engineering design to non-engineers.", (2007). Conference Proceedings, Published
Bibliography: 2007 Annual American Society for Engineering Education Conference and Exposition, Honolulu, Hawaii, June 24-27

Johnson, S. D., "Promoting educational research through the national center for engineering and technology education (NCETE).", (2006). Conference Presentation, Published
Bibliography: ASEE Global Colloquium on Engineering Education, Rio de Janeiro, Brazil, October 10, 2006. (Invited)

Becker, K. and Custer, R., "Work in progress - the national center for engineering and technology education: Supporting teacher professional development and reviewing K-12 schooling.", (2006). Conference Presentation, Published
Bibliography: Frontiers in Education Conference, San Diego, CA, October 19-22, 2006

Becker, K., "The national center for engineering and technology education: Supporting teacher professional development.", (2007). Conference Proceeding, Published
Bibliography: 2007 Annual American Society for Engineering Education Conference and Exposition, Honolulu, Hawaii, June 24-27

Walrath, D., Denson, C., Daugherty, J., & Zeng, Y., "Global insights on engineering design as content.", (2007). Conference Presentation, Published
Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas.

Mentzer, N. & Stewardson, G., "Technological literacy and USU general education students.", (2007). Conference Presentation, Published
Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Zeng, Y. & Duncan, J., "Women: Support factors and persistence in engineering.", (2007). Book, Published
Bibliography: 2007 Annual American Society for Engineering Education Conference and Exposition, Honolulu, Hawaii, June 24-27

Shumway, S., Berrett, J., Swapp, A.G., Erekson, T.L., and Terry, R.E., "A successful professional development activity to infuse engineering content for Utah 9-12 teachers.", (2007). Conference Proceeding, Published
Bibliography: 2007 Annual American Society for Engineering Education Conference and Exposition, Honolulu, Hawaii, June 24-27

Custer, R., Merrill, C., Daugherty, J., Westrick, M., & Zeng, Y., "Delivering core engineering concepts to secondary level students using the STL.", (2007). Poster, Published
Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Roue, L., "Young women's perceptions of technology and engineering.", (2007). Poster, Published
Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

McAlister, B., "Analysis of preservice/licensure technology education programs in the U.S.", (2007). Poster, Published
Bibliography: 69th Annual International Technology Education Association Conference, San Antonio, Texas

Daugherty, J., Westrick, M., & Zeng, Y., "Delivering key engineering concepts using the STL.", (2007). Poster, Published
Bibliography: 2007 Annual ASEE IL/IN Section Conference, Indianapolis, IN.

Zeng, Y., "Roles of mental models in engineering re-design.", (2007). Poster, Published
Bibliography: 2007 Annual ASEE IL/IN Section Conference, Indianapolis, IN

Westrick, M., Daugherty, J., & Zeng, Y., "Teaching core engineering concepts to secondary level technology education students.", (2007).

Poster, Published

Bibliography: 2007 Annual ASEE IL/IN Section Conference, Indianapolis, IN

Web/Internet Site

URL(s):

<http://www.ncete.org>

Description:

The NCETE Web Site was launched early November, 2004. The website has links to the doctoral fellowship form, links to NSF, ITEA, CTTE, ASEE and our partner schools.

NC A&T-specific Web site for promoting the program:

(<http://www.ncat.edu/%7Egillispc/gc08000.html>)

NC A&T professional development supplemental Web site used to support participant achievement and reduce time away from the public school classroom

(<http://www.ncat.edu/%7Egillispc/nceteprofdev.html>)

Other Specific Products

Contributions

Contributions within Discipline:

The 2008 Yearbook of the Council on Technology Teacher Education, which will deal with engineering and technology education, is in press. The team of authors, led by Tom Erikson and Rod Custer, includes a large number of Center faculty members.

At the 69th annual conference of the International Technology Education Association, a team of NCETE fellows and faculty were recognized by the Council on Technology Teacher Education for their research on delivering core engineering concepts to secondary level students through the Council's Outstanding Research Award. The reference is: Custer, R., Merrill, C., Daugherty, J., Westrick, M., & Zeng, Y., 'Delivering core engineering concepts to secondary level students using the STL.'

Scott Johnson was invited to present a paper entitled, 'Promoting Educational Research through the National Center for Engineering and Technology Education,' at the Fifth Annual American Society for Engineering Education Global Colloquium on Engineering Education, October 2006, Rio de Janeiro, Brazil.

Ken Welty, representing NCETE, and the National Academy of Engineering are partnering to survey current and past efforts to implement engineering-related K-12 instructional materials and curricula in the United States.

Roger Hill is chair of the Georgia Department of Education committee charged with developing performance standards in engineering and technology education for that state. Similarly, faculty members at BYU and USU are working with the Utah Department of Education in the redesign of the state framework for technology and engineering education.

Vince Childress, Rod Custer, Ethan Lipton, and Chris Merrill served on the Board of the International Technology Education Association during the current year. Rod Custer also served as a member of the Academy of Engineering Committee on the Assessment of Technological Literacy. Brian McAlister is presently on the Board of the Council on Technology Teacher Education serving as their Treasurer.

Tom Erikson serves as the permanent Chair of the Mississippi Valley Industrial Teacher Education Conference.

Chris Hailey, Rod Custer, and Kurt Becker serve on the K-12 Committee of the American Society for Engineering Education.

Contributions to Other Disciplines:

Contributions to Human Resource Development:

The Center has pioneered in the evolution of a distinct knowledge base for doctoral study in engineering and technology education. The model features cognitive science, design, problem solving, and creativity. It is currently exemplified in the four core courses, The Role of Cognition in Engineering and Technology Education; Design Thinking in Engineering and Technology Education; Engineering Design: Synthesis, Analysis, and Systems Thinking; and Dynamic and Network Engineering Processes for Technology Education.

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Unobligated funds: less than 20 percent of current funds

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Activities and Findings: Any Outreach Activities

Any Product

Contributions: To Any Other Disciplines

Contributions: To Any Resources for Research and Education

Contributions: To Any Beyond Science and Engineering

6. Advisory Board:

11. Professional Development:

reporting on the findings of the six explorator

Doctoral Study Activities

of integrating engineering into the classrooms. They used a formal debate format to present three

predictive analysis concepts within the context of engineering design into their technology

The Findings Section of the Annual Report consists of two components:

- € Major NCETE Findings: 2006-07
- € Annual Report External Evaluation Addendum from Inverness Research Associates

Major NCETE Findings: 2006-2007

Significant outcomes of the year include: increased research activity; the success of the cohort model for doctoral study; active participation of Center minority serving institutions and increased diversity among the Center faculty; and increased emphasis on leadership development. These achievements are aligned with the Center goals and indicative of substantial progress during the year.

The number and quality of research

Internal Evaluation Activities and Findings

INVERNESS