

Iowa Mathematics and Science Education Partnership

a collaboration of the University of Northern Iowa, Iowa State University and the University of Iowa

Six Month Progress Report

July 1 to December 31, 2008

Iowa
Math and
Science
Education
Partnership



IOWA STATE
UNIVERSITY



IMSEP IS...

Core Programs

I-TEACH Mathematics & Science Teacher Recruitment
Community College STEM Instructor Preparation
Project Lead The Way
Real World Externships for Mathematics & Science Teachers
Corridor STEM Initiative

Summits

Business-Education Partnerships
Mathematics Transitions
Summit of Teaching-Training Programs in Iowa
(mathematics and science) (upcoming)

Reports and Studies

Women & Minorities in STEM at Iowa Universities
Iowa Mathematics Transitions Guide
Iowa STEM Education Inventory
Market for Alternate Licensure (upcoming)

Sponsorships

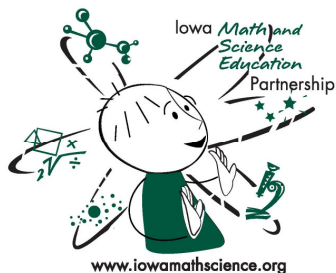
Science Center of Iowa: Robotics
Women of Innovation Celebration
Chrysalis Foundation Women in STEM

Competitive projects

12 projects launched in August 2008
4 projects launched in October 2008
7 for January 2009
15 (estimate) in February 2009

Affiliates

Iowa Academy of Science
Iowa Mathematics & Science Coalition
Iowa Department of Economic Development
Iowa Department of Education
Iowa Commission on the Status of Women
Des Moines Central Academy
Regional Academy for Math/Science, Oelwein
Iowa Council of Teachers of Mathematics
Iowa Science Teachers Section of the IAS
STEM Equity Pipeline Project
Iowa State Education Association
Iowa Biotechnology Association
Technology Association of Iowa
Association of Business and Industry
Iowa Business Council



EXECUTIVE SUMMARY

The **Iowa Mathematics and Science Education Partnership** (IMSEP) of the Board of Regents, State of Iowa, has officially operated since July 1 after Governor Culver signed it into law on May 29, 2008. Two years of planning preceded and paved the way for funding. Charged to Iowa's three public universities led by UNI President Benjamin Allen, the goals of IMSEP are to lead a broad coalition of educational stakeholders in improving mathematics and science learning pre-K through college while also producing more talented, diverse science and mathematics teachers for Iowa schools. The anatomy of the initiative at this six-month juncture prominently features four core programs across and within each of the public universities:

- *I-Teach Mathematics & Science*, a project to recruit talented teachers;
- *Project Lead The Way* expansion;
- *Community College STEM instructor preparation and updates*;
- *Real World Externships for Mathematics and Science Teachers*.

The *Corridor STEM Initiative* also operates under the IMSEP banner. In the fall of 2008, the Board of Regents approved the establishment of the **Iowa Mathematics & Science Education Institute** at UNI to oversee, coordinate, and administer programs of IMSEP. Those additional activities of the Institute include original studies and reports, the conduct of policy summits, sponsorships, communications, grant writing, coordination and networking with organizations of common interest, evaluation of initiative components, and the management of a competitive grant program.

Professionals involved in IMSEP at this point number into the hundreds. From teachers engaged in one of dozens of IMSEP professional development programs, to business leaders partnering in the design of externships, to AEA consultants aiding in transition work, to community college instructors partnering on recruitment, to university faculty serving on campus-based IMSEP committees, to the governing members of the Executive Board and the math, science, and business leaders comprising the Advisory Council, IMSEP has progressed on its third goal as well: to promote statewide collaboration and cooperation.

Each project of IMSEP has qualified by supporting the ten objectives of the initiative and by providing a detailed evaluation plan for documenting that support. Core program leaders as well as competitive project investigators provide year-end reports for renewal, in which accomplishment of objectives is the focus.

Iowa is one of dozens of U.S. states to recently launch a Science-Technology-Engineering-Mathematics (STEM) education initiative. Ours is comparatively austere; for example, Alabama (\$41 million), Texas (\$71 million), Virginia (\$124 million) and Ohio (\$200 million). Yet Iowa, with an educated, reachable populace and legions of talent in STEM education, has begun to create a model state initiative. For FY 2010, IMSEP looks to expand on the foundational activities of recruitment, educational enhancement, and collaboration to accelerate Iowa's ascension to national and international leadership. Great expectations of a broad sect of Iowans rest on the shoulders of IMSEP, given the state's desperate need for a science and mathematics savvy citizenry and workforce.

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SECTION I: Background of This Inter-University Collaborative

Rationale for IMSEP

A recent report of the National Academy of Science warned of negative economic and societal consequences for our nation if downward trends in science and mathematics education continue. According to the report, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (National Academies Press, 2007), fifteen of the twenty fastest growing occupations in the 21st century will require substantial mathematics and science preparation. Our national economy grows increasingly reliant on quality STEM (science-technology-engineering-mathematics) education at the very time when the performance of U.S. students in mathematics and science does not compare entirely favorably with youth of other developed nations (*The Nation's Report Card, NAEP, 2007*). At the root of this challenge is a shortage of mathematics and science teachers. Most students of middle school math and science are taught by instructors lacking majors or certification in those fields. Conditions will likely deteriorate before they get better since approximately 200,000 mathematics and science teachers are due to retire in the next decade (*National Commission on Teaching and America's Future, 2007*).

Numerous public and privately funded initiatives have been launched to address this serious challenge. Governors of 27 U.S. states have begun STEM education programs under the *Innovation America* initiative of the National Governors' Association. At the federal level, the America COMPETES Act (Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science) was signed into law in 2007, though funding has not followed.

In Iowa, our outlook mirrors the national condition and that of many other states. The three industry sectors of Iowa's new economy: bioscience, advanced manufacturing, and information solutions, require energized mathematics and science education programs. Yet, Iowa eighth graders placed 18th among 50 states on the 2006 National Assessment of Educational Progress mathematics exam (2007). Only a quarter of our high school graduates take physics or a computer course. And, just 50 percent of Iowa ACT-tested students are on target to be ready for College Algebra, a gateway course for mathematics and science majors. Further reflecting a national crisis, Iowa has an alarming shortage of mathematics and science teachers—173 vacancies in 2006-07 unfilled in science, and 121 in mathematics. And while laudably increasing rigor through additional mathematics and science requirements for high school graduation, a 2006 state law will further strain schools' meager recruitment prospects for quality teachers in these disciplines. Even if every current science and mathematics teaching major at all three public universities graduated at once and took positions in Iowa, the demand would still not be met.

The Iowa Board of Regents recognized these challenges and established the Iowa Mathematics and Science Education Partnership (IMSEP) on July 1, 2008. President Benjamin Allen of the University of Northern Iowa was asked to lead this collaboration of all three Regent universities. The Initiative's three goals are: 1) To improve mathematics and science performance of Iowa students; 2) To prepare more high quality mathematics and science teachers for Iowa's schools;

and 3) To promote statewide collaboration and cooperation. An inter-university Executive Board made up of faculty and administrators in mathematics and science education-related fields used the consensus challenges identified by state education leaders to develop a proposal for FY 2009 funding from the Iowa legislature. This plan targets four pressing needs: quality mathematics and science teacher recruitment, invigoration of the science and mathematics curriculum, retention and update of practitioners, and the production of community college STEM instructors. These and other activities of the universities in partnership with an array of education and business partners across Iowa are coordinated by the Institute at UNI. An Advisory Council of state and national business and education leaders is in place to oversee the program. The director's office is actively pursuing federal and private resources to augment the state's investment in STEM education excellence.

What follows is a six-month progress report of accomplishments since IMSEP was funded on July 1, 2008.

Goals and Objectives

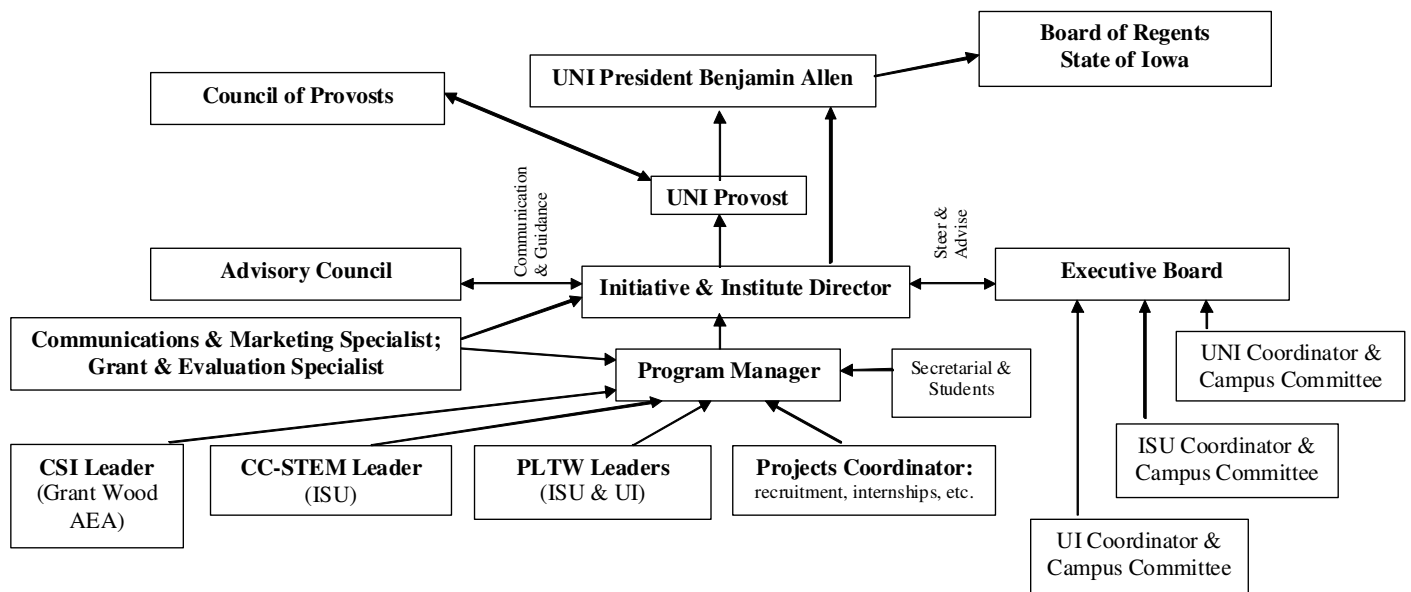
Goals

1. To improve mathematics and science performance of Iowa students.
2. To prepare more high quality mathematics and science teachers for Iowa's schools.
3. To promote statewide collaboration and cooperation.

Measurable Objectives

1. Double the number of pre-K through 12 and community college mathematics and science teachers produced by Iowa Universities in 3- to 5-years.
2. Decrease the number of unlicensed mathematics and science teachers in Iowa.
3. Decrease the attrition rate for mathematics and science teachers in Iowa.
4. Increase the quality and quantity of mathematics and science coursework available to students pre-K through 12 and at community colleges.
5. Improve the content and pedagogical knowledge of Iowa mathematics and science teachers pre-K through 12, community colleges, and the Regent universities.
6. Increase the ethnic, racial, and socioeconomic diversity of mathematics and science teachers in Iowa.
7. Improve the performance of Iowa pre-K through 16 students in mathematics and science courses.
8. Increase the number and diversity of students who major in mathematics and science fields in Iowa's Regent universities.
9. Enhance collaboration among the Regent institutions, community colleges, pre-K through 12 systems, governmental bodies, and private sector within the State of Iowa.
10. Leverage taxpayer investment in mathematics and science education.

IMSEP Anatomy



Executive Board

Nine faculty and administrators, three from each of Iowa's public universities, comprises the Executive Board for IMSEP. This body pre-existed as the Steering Committee in the developmental phase which took 18 months. The Board meets approximately monthly, frequency dictated by the timing of events and decisions. Most meetings are telephonic with semi-annual retreats scheduled at a central Iowa location. The role of the Board is to provide guidance to the IMSEP Director regarding many facets of the IMSEP initiative including operational processes, funding priorities, grant administration, and future direction. Executive Board members are points of contact for IMSEP at their respective institutions and serve a vital communication role as well. They interface between campus-based committees for IMSEP and the Executive Board. Current members of the Board are:

Walter Seaman, Associate Professor, University of Iowa Department of Mathematics
 Brian Hand, Professor, University of Iowa Department of Teaching and Learning
 Norbert Pienta, Associate Professor, University of Iowa Department of Chemistry and
 Director, University of Iowa Center for Teaching

Tom Greenbowe, Professor of Chemistry, Iowa State University
 Loren Zachary, Professor and Assistant Dean, Iowa State University College of Engineering
 Corey Drake, Assistant Professor, Iowa State University Department of Curriculum &
 Instruction

Jill Uhlenberg, Assistant Professor and Interim Department Head, Curriculum & Instruction,
 University of Northern Iowa
 Latricia Hylton, Mathematics Coordinator, Academic Learning Center, University of
 Northern Iowa
 Joel Haack, Dean, University of Northern Iowa College of Natural Sciences

Advisory Council

Members of the Advisory Council were invited to serve in this role for their prominence and leadership in the business or education realm here in Iowa and nationally. The Council meets bi-annually. A subset of this group was convened at a dinner on December 2, 2008. A full day retreat for the Advisory Council is planned for May 15, 2009, at the Science Center of Iowa. The function of the Council is to help IMSEP lead science and mathematics education:

- Guide and inform the director from leadership perspectives;
- Facilitate intra- and inter-state networking with complimentary organizations;
- Help bring Iowa's world-class education resources to bear in advancing IMSEP;
- Communicate IMSEP efforts across the state and beyond our borders;
- Create access to private and public sector resources for building IMSEP capacity.

Members of the Advisory Council are:

Camilla P. Benbow, Co-Chair – National Mathematics Panel and Patricia and Rodes Hart
Dean of Education and Human Development, Peabody College – Vanderbilt University

Mary Jane Cobb, Executive Director – Iowa State Education Association

Tom Hobson, Senior Manager of Government and Public Affairs – Rockwell Collins

Judy Jeffrey, Director – Iowa Department of Education

David Johnson, Senator – State of Iowa (*ex-officio*)

Kim Linduska, Executive Vice President of Academic Affairs – Des Moines Area
Community College

Ron Rice, Executive Director – Iowa School Board Association

Ernie Schiller, 2004 Iowa Teacher of the Year

Brian Schoenjahn, Senator – State of Iowa (*ex-officio*)

Gary Scholten, Senior Vice President and CIO – Principal Financial Group

Rachel Scott, Director – Iowa Commission on the Status of Women

Elliott Smith, Executive Director – Iowa Business Council

Peggy Steffen, Education Branch Chief (Acting) – NOAA National Ocean Service
Communications and Education Division

Gary Steinke, President – Iowa Association of Independent Colleges and Universities

Jodi Tymeson, Representative – State of Iowa (*ex-officio*)

Roger Wendt, Representative – State of Iowa (*ex-officio*)

Dick Whitehead, Superintendent – College Community School District

Institute Staff

IMSEP Director – Jeffrey Weld, Ph.D.

- Monitor implementation and evaluation of core programs (teacher recruitment, PLTW, CC-STEM, teacher externships, and indirectly, CSI), competitive awards, summits, reports and studies, sponsorships, and affiliations of IMSEP at UNI, UI, and ISU;
- Shape policy, direction, and responsibilities for the IMSEP Institute—the creation and implementation of programs;
- Oversee the solicitation, selection, and administration of both non-competitive and competitive contractual projects funded through the Institute;
- Identify and pursue external public and private funding sources for IMSEP programs;
- Convene, inform, and work with the IMSEP Executive Board;
- Form, convene, inform, and work with the IMSEP Advisory Council;
- Interface departmentally within the UNI community—academic and service sectors—to advance the IMSEP;
- Interface across Regent universities—through the Executive Board as well as directly with university administrators and faculty—to advance the IMSEP;
- Interface with affiliates and partners including the Iowa Governor’s Office, Legislators, the Department of Education, Area Education Agencies, private and community colleges, the Department of Economic Development, PreK-12 LEAs, the IMSC, ITW, CSW, SAI, and others within Iowa and nationally;
- Oversee communications locally, statewide, and nationally through presentations and print, and electronic means;
- Guide and oversee the activity of the IMSEP staff;
- Communicate the activities of the IMSEP regularly to UNI’s Provost and President and to the Board of Regents;
- Oversee the development and management of the IMSEP budget;
- Other duties as assigned by the President or Provost at UNI.

IMSEP Program Manager – Kari Jastorff, MPA

- Coordinate arrangements for meetings and special events of the IMSEP;
- Orchestrate communications with Executive Board, Advisory Council;
- Maintain event calendar;
- Work with university public relations in publicizing the IMSEP;
- Aid in the planning, implementation, coordination, and evaluation of core programs of the IMSEP (currently, teacher recruitment, PLTW, CC-STEM instructor preparation, teacher externships, and indirectly, CSI);
- Aid in the planning, implementation, coordination, and evaluation of Real World Internships through UNI, UI, ISU;
- Manage administration of the IMSEP Institute programs;
- Administer sub-award projects funded through the Institute;
- Aid in the development of proposals for external public and private funding of the IMSEP programs;
- Manage the logistics and communication of the IMSEP Executive Board;
- Work closely with officials of the offices of sponsored programs at each university in executing agreements for contractual projects;

- Manage the logistics and communication of the IMSEP Advisory Council;
- Facilitate and communicate matters of the IMSEP across UNI academic and service sectors;
- Facilitate and communicate matters of the IMSEP across Regent universities;
- Facilitate and communicate matters of the IMSEP to affiliates and partners including the Iowa Governor's Office, Legislators, the Department of Education, Area Education Agencies, private and community colleges, the Department of Economic Development, PreK-12 LEAs, the IMSC, ITW, CSW, SAI, and others within Iowa and nationally;
- Oversee the activity of the IMSEP support staff including secretarial and student employees;
- Monitor the IMSEP programs at UNI, ISU, and UI through communications with project leaders and campus coordinators;
- Facilitate the communication of the IMSEP events to UNI Provost and President;
- Manage the IMSEP budget in coordination with campus business offices at UNI, ISU, and UI;
- Prepare budget reports in coordination with campus business offices;
- Other duties as assigned by the IMSEP Director.

IMSEP Projects Coordinator – Jill Humston, Ph.D.

- Plan and implement specific core projects as assigned—currently Teacher Externships pilot, among other duties;
- Develop and plan additional projects within the Institute in partnership with faculty from UNI, ISU, UI;
- Work closely with Evaluation Specialist to incorporate assessment measures into projects;
- Aid in planning and implementation of suitable subsequent projects proposed by the Executive Board;
- Aid in the administration, implementation, and evaluation of competitive grant projects;
- Aid in planning and implementation of programs of the IMSEP Institute;
- Contribute expertise as appropriate toward duties of the Program Manager and Grants/Evaluation Specialist;
- Other duties as assigned by the IMSEP Director.

IMSEP Grants & Evaluation Specialist [position vacant for FY 2009]

[Grant authoring currently covered by Dr. Jill Humston; evaluation responsibilities currently borne by Weld, Jastorff, Humston.]

- Seek out and pursue external funding opportunities to support the IMSEP;
- Network regularly with each campus' offices and individuals responsible for external funds management;
- Evaluate and consult on assessment plans of core programs of the IMSEP;
- Evaluate and consult on assessment plans for Institute activities;
- Evaluate and consult on assessment plans of competitively funded projects;
- Prepare assessment reports for accountability stakeholders: Director, Advisory Council, Board of Regents, Legislature, etc.;
- Contribute expertise as appropriate toward duties of the Program Manager and Projects Coordinator;
- Other duties as assigned by the IMSEP Director.

IMSEP Communications and Marketing Specialist

[To be named February 2, 2009. Duties currently covered by Weld, Jastorff, Humston]

- Develops content and writes all educational and communication materials for the IMSEP: website, publications, newsletters, letters, e-mails, displays, video, audio, promotional materials, speeches, presentations, news releases;
- Establishes the strategic communication plan;
- Works collaboratively with all internal and external partners, faculty and staff to convey consistent messages;
- Works closely with business partners to develop sustainable relationships to promote the IMSEP goals;
- Coordinates the dissemination of strategic messages with internal and external constituents;
- Coordinates all the IMSEP special events, displays, and meetings;
- Works closely with the IMSEP Director, Program Manager, Executive Board, and all committees to establish a coordinated and effective plan for conducting meetings; and provides leadership for various committees;
- Other duties as assigned by the IMSEP Director.

IMSEP Secretary/Receptionist

[To be named January 30, 2009. Duties currently covered by Weld, Jastorff, Humston]

- Provides clerical office support; distributes mail, receives visitors, answers telephone, screens calls, screens general program e-mail messages, and refers matters to the appropriate persons;
- Schedules meetings;
- Edits and proofs materials;
- Composes correspondence as needed;
- Makes travel arrangements, preparing all necessary paperwork; maintains general databases and spreadsheets, operates office equipment;
- Assigns, coordinates, and reviews work of student employees (currently two graduate students and three undergraduate students).

Campus Points of Contact and Campus Committees

The management of IMSEP activities at each public university is coordinated by a designated individual who volunteered to serve until formalized campus coordinator positions can be established. At UNI, this role is fulfilled by Dr. Catherine Miller of mathematics. At UI, the role is currently held by Dr. Brian Hand, science education; and at ISU, Dr. Carla Peterson, associate dean in Human Sciences, is temporarily coordinating campus-based efforts. Committees for managing the multiple campus-based decision regarding IMSEP (personnel decisions—e.g., faculty lines, the allocation of funds for scholarships, faculty development, etc.) are at varying stages of development at the three universities. UNI and ISU have well-established and functioning committees in place. The activities of campus coordinators and committees are informed by Executive Board members of respective institutions. Eventual communication across institutional committees will enhance each one's function.

IMSEP Budget Overview

IMSEP Budget Categories	Total Budgeted/ Contract Amount
Corridor STEM Initiative (CSI)	
Grant Wood AEA non-competitive grant - subcontract	\$200,000
Community College STEM Instructor (CC-STEM)	
Iowa State University Pilot Program non-competitive grant - subcontract	\$270,000
Project Lead The Way (PLTW)	
Iowa State University non-competitive grant - subcontract	\$162,500
University of Iowa non-competitive grant - subcontract	\$107,500
Teacher Real World Internships	
2008 Research for Teachers (RET) Program	\$17,000
Mathematics & Science Teacher Recruitment	
Iowa State University Recruitment Program non-competitive grant - subcontract	\$136,399
North Iowa Area Community College Recruitment Program non-competitive grant - subcontract	\$18,600
University of Northern Iowa Recruitment Program	\$97,230
Iowa Mathematics and Science Education Institute	
IMSEP Competitive Grants	
• Fall 2008 Awards	\$1,052,771
• Spring 2009 Awards	\$550,000
IMSEP Library Support - 3 Regent Universities	\$100,000
IMSEP Collaborative Partnerships Support	\$56,500
IMSEP Institute Support - 3 Regent Universities	
Iowa State University non-competitive grant - subcontract	\$219,333
University of Iowa non-competitive grant - subcontract	\$219,333
University of Northern Iowa	\$128,638
IMSEP Institute Management & Operations	\$664,196
FY 2009 TOTAL BUDGET APPROPRIATION	\$4,000,000

SECTION II: Institute and Programs

About the Iowa Mathematics and Science Education Institute

This institute was created to provide much-needed organizational structure for maximizing the talents of Iowa's many professionals—from public and private sectors—in mathematics and science education. The synergistic value of three world-class universities combining forces, linking to Iowa businesses, industries, governmental agencies, private and community colleges, non-governmental organizations, and PreK-12 schools, represents this state's best foot forward in solving an impending crisis in mathematics/science education. A prescient need identified at the *IMSEP* 2007 inaugural summit was for "...a clearinghouse or central coordinator" to resolve the "...scattered and uncoordinated mathematics/science efforts" taking place across Iowa. Some 27 other states have successfully launched STEM education initiatives, most of them prominently featuring early commitments to coordinating centers.

The Iowa Mathematics and Science Education Institute at the University of Northern Iowa facilitates the collaborative efforts of the University of Iowa, Iowa State University, and the University of Northern Iowa in concert with private and public entities to achieve the goals of this initiative: to improve mathematics and science performance of Iowa students, to prepare more high quality mathematics and science teachers for Iowa's schools, and to promote statewide collaboration and cooperation. The activities of the Institute present powerful leveraging potential toward competitive funding sources. Activities befitting this Institute are already underway with recently completed summits on STEM Education, a Mathematics Transition Guide for Iowa high schools, a public-private sector symposium, and two rounds of grant competition open to Regent faculty projects supportive of IMSEP goals. Faculty and staff who make up the Institute are distributed across the Regents universities, coordinated by the director and central staff. At full strength, the Institute will facilitate far-reaching mathematics and science education programs as well as intersect with related fields at each Regents university—from agronomy to accounting, epidemiology to music—for comprehensive impact on mathematics and science education in Iowa.

The Iowa Mathematics and Science Education Institute is the coordinative and evaluative center for IMSEP. Each of IMSEP's four core projects and the dozens of additional activities of the initiative are shared responsibilities of a stakeholder constellation—three public universities networked to private and community colleges, preK-12 schools, AEAs, business and industry, government, and relevant organizations. Their coordination is a primary function of the Institute, yet it is also intended to function as a leveraging arm of IMSEP with staff dedicated to pursuing external resources. The Institute is charged with evaluating program and project goals and objectives. And, finally, the Iowa Mathematics and Science Education Institute is a sorely needed hub or central STEM Education point of contact for intra- and inter-state leadership for these disciplines essential to 21st century economic and societal progress.

The many related endeavors of this Institute will be phased in over a span of one to seven years as resources—human and financial—are ramped up.

Iowa STEM Education Public-Private Partnerships Symposium, December 2, 2008

This STEM symposium was conducted in recognition of Iowa's many "pockets of brilliance" that bring public and private partners together, but which often function in parallel or in isolation. Partnerships are a vital aspect of Iowa's STEM education future, thus the IMSEP mission includes the expansion of successful partnerships and the forging of new ones. One-hundred thirty participants from across the state representing leadership in business, industry, and education gathered at UNI's Maucker Union for morning briefings on the condition of education in Iowa (Iowa Department of Education Director Judy Jeffrey), a profiling of IBM partnerships (Dr. Valerie Pace), and seven exemplary partnerships within Iowa (representatives from Rockwell Collins, Kemin Industries, Pella Corporation, Corridor STEM Initiative, Workplace Learning Connection, Glenwood Schools, Des Moines Central Academy). Afternoon break-out sessions grouped participants across the public-private spectrum for frank discussions of what needs to take place in Iowa so that such partnerships can thrive. A wealth of data on seven separate considerations was collected and organized by major theme. Following upon the success of the event, IMSEP has assembled an action committee of select participants to enact recommendations of the group. The committee will meet through early spring of 2009 to put actions in place.

Grant Writing

Despite a grant writer vacancy at the Institute, the team has begun to pursue leveraging from local and national funding agencies. A proposal to the National Science Foundation is currently in development. And, a \$468,949 proposal to NASA was recently filed for the inter-university project to accord research experiences to future STEM-field teachers. Such experiences have been demonstrated to powerfully impact future teachers to incorporate real life examples and active investigations into the curriculum.

The NASA proposal, *STEM Pre-Service Educator Research in Climate Change* (STEM-PERCC), places pre-service teachers of STEM disciplines into the climate change research laboratories of scientists at Iowa State University, the University of Iowa, and the University of Northern Iowa, then guides those pre-service teachers in translating their research into lessons and units at the hand of pedagogy mentors. NASA-funded researchers, NASA educator resources, and NASA Explorer Schools will each be involved in phases of the pre-service teacher experience—from the laboratory to the development of school curriculum, to the testing of lessons in the field. This program leverages the human and financial resources of a new state-wide collaborative, the Iowa Mathematics and Science Education Partnership (IMSEP). Through IMSEP, Iowa's public universities have created a scaffold for establishing mutually beneficial projects such as STEM-PERCC. Existent resources will be used to augment funds of NASA in the administration, implementation, and evaluation of STEM-PERCC. Two of Iowa's public universities (UNI and ISU) have run research-experience-for-teachers (RET) programs for several years. Such programs are an effective and necessary professional development mode *only* because too few undergraduate STEM teaching majors are given real research opportunities. This project aims to achieve the same results as RET experiences with the added benefit of integrating the research within the undergraduate sequence: to improve content knowledge in global climate change, to

improve understandings of the nature of science, and to increase the likelihood of replicating scientific inquiry in classrooms.

Reports

Two major studies and resultant reports have been commissioned of IMSEP to date. In both instances, inter-university teams of writers and reviewers were assembled to fulfill the charge.

Women and Minorities in STEM Programs at Iowa Public Universities

In September of 2008, IMSEP assembled a collaborative team of faculty and staff from Iowa's public universities, working with contributors from the Iowa Department of Education, to conduct a study of the number and proportion of women and minorities enrolled in science, technology, engineering, and mathematics programs, including high school programs such as Project Lead The Way. The report was delivered to the Iowa General Assembly on January 5, 2009. The report includes recommendations for improving the number and proportion of women and minorities in STEM university programs. This report looks to answer three questions relevant to the legislative charge:

- 1) What do general indicators suggest about the preparation of high school-age women and students of diversity for science-technology-engineering-mathematics (STEM) study at Iowa's public universities?
- 2) What is the current representation of women and minorities in STEM fields at Iowa's three public universities?
- 3) What are key recommendations for maintaining and improving the proportion of women and minorities enrolled and degreed in STEM fields at Iowa public universities?

Indicators including the results of standardized tests (the Iowa Test of Educational Development and the ACT), advanced course taking, and course grades and grade point averages all suggest that young men and women enjoy similar opportunities and successes in high school STEM fields of study. For Iowa's minority students, performance gaps persist, but increased opportunities for advanced coursework help close the gap.

Project Lead The Way is a rapidly expanding high school program of engineering-related courses reaching 87 high schools in 2008—though proportional participation of women and minorities lags.

At Iowa's public universities the proportion of women and minorities in STEM majors has generally increased over the last nine years. Women comprise the majority of majors in some fields of STEM study, including the biological sciences at the undergraduate level and veterinary medicine at the graduate/professional level. The numbers of minority students enrolling and earning degrees at the public universities have been on a steady climb. However, the proportion of women choosing STEM fields of study is well below campus populations.

Likewise, as percentages of some minority groups increase on the university campuses (e.g., African American and Native American students), matching increases in their numbers in STEM

majors are not always seen, particularly in physical science, computer science, and engineering. A series of recommendations derived from the ample and growing literature regarding best practices in providing for successful study in STEM for women and minorities, indeed all students, is provided. In addition to highlighting existing programs for recruiting and retaining women and minorities in STEM fields, seven recommendations are proposed for increasing the proportion of women and minorities in STEM fields:

1. Seek opportunities for ongoing and new STEM initiatives within the state to increase the number of women and/or minorities participating and succeeding where imbalances exist.
2. Maintain existing STEM diversity programs at Iowa public universities and pursue opportunities to expand these programs within and beyond the public university system.
3. Encourage additional collaborations across Iowa's public universities, within the universities, and among the universities and the Iowa Department of Education, Iowa private and community colleges, Iowa Department of Economic Development, Iowa Workforce Development, regional economic development groups/STEM employers, K-12 schools, AEAs, and other educational institutions and groups on issues and programs addressing women and/or minorities in STEM.
4. Aspire to institutionalize STEM diversity/gender positions and programs within the normal administrative structures of Iowa's public universities.
5. Provide opportunities for faculty involvement in programs associated with women and/or minorities in STEM.
6. Provide professional development opportunities for university faculty and staff on research-based best practices for creating teaching/learning experiences in STEM disciplines that most effectively meet the learning needs of all students, particularly those underrepresented in the instructor's field.
7. Provide annual updates on enrollment and graduation of women and minorities in STEM programs to the Board of Regents, State of Iowa.

Mathematics Transitions Guide

High school and college educators in the U.S. have long struggled with the problem of poor student transition from high school to college mathematics. Faculty at the University of Northern Iowa, Iowa State University, and the University of Iowa addressed how to improve student preparation and teacher awareness of the entry expectations for mathematics courses at Iowa's Regent universities. In November, 2007, UNI hosted a Mathematics Transitions Congress for state educators, legislators, and business leaders to discuss the challenges facing students and teachers in mathematics. One of the outcomes of the meeting was the need for more communication between mathematics instructors at the university and high school levels—particularly the identification of key skills and competencies expected of students entering the universities. As a result, university faculty have developed the *Iowa High Schools-to-Regent Universities Mathematics Transition Guide*.

The guide provides high school teachers the mathematics competencies students need to enter university mathematics and science courses. It gives the foundational skills and competencies for six entry-level university courses: pre-calculus, calculus I, calculus II, statistics, finite mathematics, and mathematics for elementary teachers. The guide also addresses the mindset

and learning experiences of students at the high school and college levels to help instructors better meet their needs. The guide is a model not only for other states, but for other academic areas to follow. It was distributed to every Iowa high school, area education agency, and university as well as other professional organizations.

Stakeholder Communications

Regular newsletters—physically and electronically disseminated—and press releases are the primary communications mechanisms for stakeholder updates regarding IMSEP. Avenues are planned for expansion upon the identification of a qualified communications and marketing specialist.



a collaboration of the University of Northern Iowa, Iowa State University and the University of Iowa

iowamathscience.org

Issue 3: November 2008

IMSEP at the Science Center of Iowa

A couple of thousand visitors to the **Science Center of Iowa** on two very busy Saturdays lately were greeted by IMSEP staffers Tyler and Adam (pictured, right). IMSEP is partnering with the Science Center in coordinating Saturday presentations by Regent university faculty this fall, as well as co-sponsoring the traveling robots exhibit.



Iowa STEM Education Public-Private Partnerships Symposium Dec. 2

Business and education leaders from across Iowa have registered to participate in this landmark event to find 21st century solutions to school and work challenges. Co-sponsored by Rockwell-Collins, the Iowa Association of Business & Industry, and IMSEP, the morning will feature keynote speaker Valerie Pace of IBM sharing learning partnerships of her corporation, followed by the successful “pockets of excellence” of eight panelists working in school-business

Inventory

In the organizational phase for IMSEP, an assessment of pre-existing efforts in STEM education was conducted through which an inventory was assembled. Planners used the inventory as a baseline and as a source for replicable programming. It is a built in feature of the IMSEP web site—searchable by institution, director, and funding source—and continues to be updated as programs launch and close.

Board of Regents, State of Iowa
Mathematics and Science Education Collaborative Initiative
 Resources | Events | Presentations | News/Announcements | Steering Committee | Partners
 Math and Science Education Activities Inventory
 Iowa Department of Education and Board of Regent Universities
 2007

By Institution | By Program Director | By Funding Source | List All Programs | Search

Institution Name:

- AEA10
- AEAS/LEAS
- AMES LABORATORY/IOWA STATE UNIVERSITY
- AREA EDUCATION AGENCY 267
- CENTER FOR ENERGY AND ENVIRONMENTAL EDUCATION
- COLLEGE CAREER ACADEMIES
- COLLEGE OF NATURAL SCIENCES, UNI
- DES MOINES WATER WORKS
- DMACC - 11
- EICCD - 9
- GEORGIA SOUTHERN UNIVERSITY
- ICC - 5
- IHCC - 15
- ILCC - 3
- IOWA ACADEMY OF SCIENCE
- IOWA MATHEMATICS AND SCIENCE COALITION - UNIVERSITY OF NORTHERN IOWA
- IOWA STATE DEPARTMENT AND THE UNIVERSITY OF NORTHERN IOWA
- IOWA STATE UNIVERSITY
- IOWA STATE UNIVERSITY EXTENSION
- IOWA STATE UNIVERSITY EXTENSION, DES MOINES COUNTY
- ISU
- IVCCD - 6
- IWCC - 13
- KCC - 10
- KENNEDY HIGH SCHOOL, CEDAR RAPIDS
- NCC - 4
- NIACC - 2
- NICC - 1
- PRICE LABORATORY SCHOOL, UNIVERSITY OF NORTHERN IOWA
- SCC - 16
- SCOTT COUNTY EXTENSION
- THE KRELL INSTITUTE
- UNI
- UNI - CEEE
- UNI MUSEUMS
- UNIVERSITY OF CALIFORNIA, BERKELEY/UNIVERSITY OF NORTHERN IOWA

Sponsorships

IMSEP has leveraged resources in order to impact target populations including youth, particularly under-represented populations in STEM—women and minorities.

Science Center of Iowa Sponsorship/Coordination: IMSEP was pleased to partner with the Science Center of Iowa (SCI) in bringing a traveling “Robots: The Interactive Exhibition” to the SCI this fall. Along with co-sponsoring this exhibit, IMSEP coordinated Regent faculty/student programs and presentations along related themes on three very busy Saturdays at the SCI—September 20, October 25 and November 8, 2008. Several thousand visitors were greeted by IMSEP staffers and enjoyed the Regent faculty/student demonstrations as well as the exhibition.

September 20, 2008, was the opening day of the robots exhibit. University of Northern Iowa Physics Professor Cliff Chancey presented "Robots: Fact or Fiction."

October 25, 2008, was the Science Center of Iowa's Spooky Science Event with over 2,000 visitors. IMSEP staffed an information booth. Iowa State University's chemistry club was there as well as several student and faculty representatives from the University of Iowa's College of Engineering. UI Engineering Professor David Wilder presented a program on "The (delicious?) Dynamics of the Human Spine" (an oreo & marshmallow demonstration. University of Iowa College of Engineering students provided several experiments on this date. They are listed below:

- "Let's Get Frozen" – The affects of dry-ice on various materials and items. Does a balloon pop? Will the ball bounce once it's frozen? What happens to a gummy bear?
- "Don't Get Slimed!" — How to make slime, oobleck and blurch. What is the difference between them? Are they useful?
- "Tesla Coil - The Lightning Machine" – A tesla coil uses magnetics to transform a voltage to a larger voltage, usually this produces sparks, which is the cool thing about a tesla coil.
- "Illusions: Can you tell between the real and imaginary?"
- "The Amazing Water Purification Demonstration" – a clear five gallon bucket filled with tap water. As fine clay sediment is added to the water, the mixture appears cloudy and dirty. A Pur packet is then added to the five gallon bucket to demonstrate the process of coagulation, flocculation and purification.

November 8, 2008, was the First LEGO League Competition, coordinated by Iowa State University's College of Engineering. IMSEP again staffed an information booth. UNI Professor Cliff Chancey provided Mini-Sumo Robots & UNIBot demonstrations. UNI Professor Chad Heinzl presented a Stream Table demonstration.

This sponsorship provided a tremendous opportunity to reach out to several thousand children and their families.

Women of Innovation: IMSEP collaborated with the Technology Association of Iowa to produce the inaugural Iowa Women of Innovation 2008 Awards event on November 11, 2008, in Des Moines. This event recognized nine outstanding women from across Iowa who had distinguished themselves as accomplished innovators in STEM through industry or education leadership.

Chrysalis Foundation Insights Event: IMSEP was a co-sponsor of the 2008 Insights Event held by the Chrysalis Foundation on October 16, 2008, which "Explored a University of Opportunities" with Dr. Mae C. Jemison, the first woman of color to blast off into space. Over 450 attended the event in support of the Chrysalis Foundation's mission of developing strong women and girls in Greater Des Moines through education, grant making, and philanthropy.

Competitive Grant Program

In August of 2008, a first round of proposals were solicited and reviewed by an inter-university team of faculty to identify exemplary projects that support the goals and objectives of IMSEP. Twelve such projects were funded which span such areas as the use of art and music to teach science and mathematics, the professional development of teachers in the field of green technologies, and the creation of a pre-college mathematics and science academy for low income and minority youth. A smaller scale award selection process was managed in September for the University of Iowa, unprepared for first round competition due to flood recovery. And in January, 2009, one more opportunity to compete for funds to support projects aligned with IMSEP goals is being orchestrated.

All sixteen of the funded projects in 2008 are viewable at the IMSEP website. In summary of this component of the program, thirty-four proposals received.

- 24 – University of Northern Iowa Principal Investigators
- 6 – Iowa State University Principal Investigators
- 4 – University of Iowa Principal Investigators (all in the September special opportunity for UI)
- 14 – Regent university collaborations
- other collaborations: AEAs, K-12 schools, community colleges, private colleges, governmental organizations, businesses
- 14 – science, 8 – mathematics, 12 – interdisciplinary (STEM)

Sixteen proposals were approved for funding by the IMSEP Executive Board in 2008:

- 8 – University of Northern Iowa Principal Investigators [33% of submitted]
- 4 – Iowa State University Principal Investigators [67% of submitted]
- 4 – University of Iowa Principal Investigators [100% of submitted]
- 8 – Regent university collaborations
- 5 – science, 4 – mathematics, 7 – interdisciplinary (STEM)
- Total competitive grant funded in fall, 2008: \$1,052,771

Please find below the titles, the lead principal investigators, brief descriptions and current activities and actions underway for each of sixteen of the fall 2008 projects.

- **Learning Progressions to Support Science Teaching & Learning** – Alicia Alonzo, UI
 - This two-part project draws upon ongoing work on several learning progressions to address each of these two areas of need. In particular, the proposed project would explore ways in which learning progressions may be used to make meaningful diagnoses of students' scientific understandings and develop learning progressions and associated assessment items for two elementary school science topics – plant nutrition and electricity.
 - Activities and Actions to date:
 - Collected data from 312 students (representing 6 teachers from 4 districts)

- **The Carmen Sosa Farming Curriculum Project** – Katherine Bruna, ISU
 - This planning project proposes to develop inter-institutional and statewide collaboration around the use of the Marshalltown Community College farm as a site from which to develop rich, literacy-infused curriculum that links the informal mathematics and science learning afforded by farm-based activity to the formal school-based math and science programs of study. The larger purpose of the project is to, drawing on a community-based “funds of knowledge” framework, enhance math and science learning for culturally- and linguistically-diverse youth, as well the pedagogy of their teachers, and broaden opportunities for career exploration.
 - Activities and Actions to date:
 - Held organizational meetings on September 26, October 24, and December 12, 2008.

- **Iowa Student STEM Symposium** - Lyn Countryman, UNI
 - Symposium bringing students and teachers together to increase the number of students taking mathematics and science courses in high schools; to attain a higher level of achievement from students taking mathematics and science; and to inform a greater number of students about careers in mathematics and science.
 - Activities and Actions to date:
 - Held Symposium on November 5, 2008– 41 schools represented, 279 students, in all 311 attendees.

- **RAISE and RET** – Dawn Del Carlo, UNI
 - This proposal seeks to establish collaboration between the existing programs Research Avenues for Iowa Science Educators (RAISE) at the University of Northern Iowa and Research Experiences for Teachers (RET) at Iowa State University through two one-day workshops with the intent to: 1) Evaluate the implementation of inquiry based teaching and learning as a result of a professional development STEM research experience, 2) Create a forum for teachers who have participated in a professional development STEM research experience to share best practices relating to implementation of scientific inquiry into STEM curricula, and 3) Lay the groundwork to establish a centralized network of STEM research programs for teachers at the three Regent’s institutions. Workshops involve key note speakers, presentations by former participants of RAISE and RET, and facilitated discussions of classroom implementations.
 - Activities and Actions to date:
 - Held first conference on November 24, 2008, at the University of Northern Iowa in Cedar Falls
 - Planning April 20, 2009, Conference at Iowa State University in Ames.

- **Iowa Mathematics and Science Academy, (IMSA)** – Angela Francis, UNI
 - Generate in 40 low-income, first-generation and minority students yearly the skills and motivation necessary to complete a program of secondary education and matriculate

to a postsecondary institution with degrees in mathematics, science and technology-related fields.

- Activities and Actions to date:
 - Held meetings with principals from 28 public and private high schools in Black Hawk, Bremer, Butler, Buchanan, and Grundy counties.
 - Recruiting student participants for the program.
- **Improving Chemistry Teaching in Iowa** – Bill Harwood, UNI
 - Survey the use of chemistry laboratory experiments in the State of Iowa to ascertain the needs of Iowa's high school chemistry teachers with respect to doing lab activities and conduct workshops to train chemistry teachers to effectively implement student-oriented guided inquiry teaching strategies.
 - Activities and Actions to date:
 - Attended and presented at the Iowa Science Teaching Section of the Iowa Academy of Science Annual Conference on October 23, 2008, and solicited information to build a survey, which will go to all chemistry teachers across the state of Iowa.
 - Workshops are being planned for Spring and Summer 2009.
 - Survey is being prepared for distribution in Spring 2009 to all Iowa chemistry teachers regarding their needs (content/pedagogy/equipment).
- **Learning Math and Science Through the Arts** – Amy Hunzelman, UNI
 - Professional development workshops for classroom teachers and education students to master learning objectives in both the subject area and the art form.
 - Activities and Actions to date:
 - Spring 2009 Scheduled Events at <http://www.gbpac.com/outreach/lmsta.shtml>
 - Exploring Habitats through Creative Movement—January 27-30, 2009
 - Scientific Thought in Motion—February 9-13, 2009
 - Math + Dance: Exploring Sequence and Combinations—March 3-5, 2009
 - Summer Workshop: Moving through Math—Teaching K-6 Mathematics through Rhythm and Movement—June 10-12, 2009
- **Teachers' Circle for Central Iowa Middle School Mathematics Teachers** – Elgin Johnston, ISU
 - Creation and operation of a Teachers' Circle (*a group of teachers and mathematicians who meet regularly to learn about problem solving activities*) for some central Iowa middle school mathematics teachers.)
 - Activities and Actions to date:
 - Held first meeting on October 21, 2008.
- **Seamless Transitions Into and Through Science Teacher Education** – Joanne Olson, ISU
 - Project focuses on science teacher recruitment and retention through the development of a workshop series for cooperating teachers and university supervisors

to address research-based effective science teaching practices and to assist beginning teachers on how to implement such practices.

- Activities and Actions to date:
 - Held first workshop October 22, 2008, in Des Moines.
- **Improving High School Biology Teachers' Pedagogical Content Knowledge Using a Web-Based Video Analysis Tool** – Soonhye Park, UI
 - This proposed exploratory project is to support Iowa high school science teachers to improve their pedagogical content knowledge (PCK) through two avenues: a) providing a systematic professional development (PD) and b) enhancing reflection capacity using a web-based video analysis tool (VAT). The PD and reflection will focus on developing two main components of PCK: a) understanding of what difficulties or misconceptions students have in learning specific topics and how to assess them, and b) understanding of teaching strategies as to how to confront student misconceptions and meet learning needs.
 - Activities and Actions to date:
 - Recruiting 10 biology teachers who are willing to participate in this project.
 - Developing questionnaire items to examine participating teachers' understanding of student thinking in photosynthesis and teaching strategies.
 - A two-day professional development session was held with the 10 biology teachers at the University of Iowa during January 13 and 14, 2009.
 - Development of two types of lenses for VAT (e.g., inquiry lens and PCK-KSU lens)
- **AREA: Math-Science Engineering Technology in Iowa on Applied Renewable Energy Areas, (MSETI)** – Recayi Pecan, UNI
 - Provide area teachers with an applied Mathematics and Science curriculum package based on Photo-Voltaic (PV), wind power and hydrogen fuel-cell fundamentals. Utilize the energy bike "UNI e-Bike" project which will be introduced through a series of weekend professional development workshops.
 - Activities and Actions to date:
 - Held workshop on November 1 and November 8, 2008, for Cedar Valley Region Mathematics, Science, and Technology teachers on renewable energy technology and their applications to promote STEM. The main theme of the workshop involved mathematics in solar, wind, and Hydrogen fuel cell applications in an innovative way. Introduction of the energy efficiency idea with supporting mathematical expressions, as well as the importance of the subject in our daily lives were also introduced in the workshop. Spring 2009 semester project work will include curricular activities in the selected Cedar Valley schools, training on Hydrogen fuel cell fundamentals at UNI, publication efforts, and a web site design on the MSETI-AREA project.
 - Students visited UNI Electrical and Informational Engineering Technology labs on September 24 and October 1, 2008, on renewable energy technologies. This activity is being continued in spring 2009.

- **Improving Mathematics Instruction in Preschool Classrooms** – Carla Peterson, ISU
 - Review, develop, implement and evaluate mathematics curricular materials for Pre-K classrooms to share with Pre-K teachers for enhanced mathematics instruction.
 - Activities and Actions to date:
 - Developed and begun to use a tool to review existing mathematics curricula.
 - Developed and begun to use a shared webspace where faculty involved can review articles.

- **EMPOWER** – Walter Seaman, UI
 - EMPOWER is a three-year (2008-2011) MSP grant funded to deliver over 100 hours per year of mathematics content and Lesson Study training to the entire mathematics-teaching staffs at three GWAEA elementary schools (about 60 teachers). IMSEP funding allows the project to grow in scope and to include more teachers than are currently budgeted for through the MSP funds.
 - Activities and Actions to date:
 - Summer institute, July 27- August 1 — Student Learning and Pedagogy in area of numbers and operations
 - Academic Year Seminar October 29
 - Five Lesson Study in-service meetings have taken place – professional development.
 - Title II Conference October 27.

- **Planning For Success In STEM For Students With Disabilities** – Gregory Stefanich, UNI
 - A two-day working conference with follow-up publication to stimulate dialog to 1) improve attitudes toward, 2) investigate ways to better support and 3) plan accommodations/supports for students with disabilities who have interests in Science, Technology, Engineering and Mathematics, in secondary and post-secondary settings.
 - Activities and Actions to date:
 - Planning conference for April 1-2, 2009, on the University of Northern Iowa Campus and identifying teachers, students, and speakers who will be invited to participate in the working conference.

- **Traversing Parallel Lines** – Bonnie Sunstein, UI
 - Guided by two expert high school geometry teachers, two classes of students—one in Iowa and one in Boston—will discuss geometric concepts through distance education technologies. The goal of this project is to link writing and mathematics and investigate the effect of language on understanding and performance in mathematics. The research team is cross-disciplinary: one professor of mathematics, one professor of English, two teachers, and sixty students in two very different geographic areas.
 - Activities and Actions to date:
 - Held organizational meeting.

- Identified high school geometry teachers in Keota, IA, and Revere, Massachusetts.
 - Began to review available literature on writing and identity in mathematical concept formation, and collaborative partnerships in problem-solving.
 - Consulted with test makers in both states to find appropriate instruments in geometry pre- and post-test.
- **Improving Science Instruction in Pre-K Classrooms** – Betty Zan, UNI
- Creation of collaboration among early childhood education and science education faculty to improve science education for young children in Iowa.
 - Activities and Actions to date:
 - Planning, developing, and gaining contacts for project.

Institute Functions at Iowa State University

Institute-related functions at ISU – our planning team has been meeting regularly. Our goal is to fold IMSEP-related activities into a broader set of activities related to enhancing STEM education at ISU. These activities (at least hopefully) will be conducted under the umbrella of our *Center on Excellence in Science, Mathematics, and Engineering Education*. We are in the process of getting the name of the Center changed officially to this name and developing a university-wide coordinating council to provide oversight and leadership for the activities.

We are launching a search for a senior faculty member in mathematics or science education. This individual will be director of CESMEE and provide leadership for STEM education and IMSEP activities at ISU.

We have launched discussions at developing guidelines and recruiting some faculty members who will hold joint appointments between Curriculum and Instruction and a content-related department (e.g., physics).

We have launched our scholarship program – making up to \$2,000 for spring semester and up to \$4,000 for summer term available to science or mathematics education students. We have an on-line application process, and students are submitting applications. The first awards were made in early December.

The Exploring Science and Mathematics Teaching one-credit course will be offered in the spring semester. Alex Andreotti, an experienced mathematics education instructor, is slated to teach the course. Flyers to distribute to students are being prepared.

We are putting a laboratory research experience program in place for pre-service teachers. We hope to launch this during spring semester. We think that this is a very unique opportunity that ISU can provide for pre-service teachers, and we hope to build on experience already gained by scientists associated with the Ames Lab who run a similar type of program during the summers. We think that we will be able to find scientists associated with the Ames Lab, as well as LAS and Engineering faculty members, who will be willing to work with undergraduate students. We

may even be able to leverage some additional funding for this from the U.S. Department of Energy.

We plan to use some funds to expand some ongoing summer programs for in-service teachers to allow partial participation for pre-service teachers. There are already programs at ISU each summer, and we are working with staff members associated with those programs to find ways to include pre-service students in activities as appropriate.

We are using the \$100,000 awarded to ISU, as part of the overall project, to provide internal funding to projects developed by faculty and staff. We have awarded a small internal grant to the Mathematics Department to hold some recruiting sessions aimed at high school students in IA. We are reviewing an additional proposal aimed at strengthening some summer programs designed to enhance the skills of in-service science teachers.

We have four different teams working on projects funded via the competition held during the summer of 2008. All of these projects involve collaborative efforts with other universities, community colleges, and/or AEAs and LEAs.

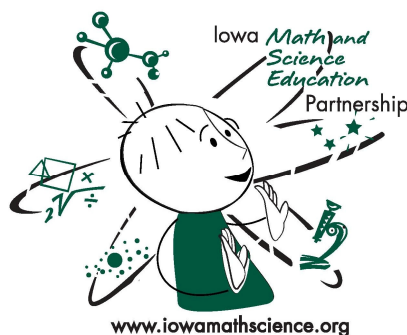
A seminar series is planned for spring:

Date	Name, Working Title	Email	Place
Jan 20	Charles Henderson, Systemic Change in STEM teaching	charles.henderson@wmich.edu	Western Michigan University
Feb 3	Zach and Camille, PLTW	zach@iastate.edu camilles@iastate.edu	ISU
Feb 17	Bill Bayley, Purdue, Science Van	wbayley@purdue.edu	Purdue
March 3	Patricia Simmons	patricia_simmons@ncsu.edu	NC State
April 7	Deborah B. Exton, Green Chemistry education,	dexton@uoregon.edu	University of Oregon
April 21	Maureen Scharberg, Associate Dean of Special Projects, College of Science San Jose State University, Increasing numbers of Women and Minorities in STEM	mscharberg@gmail.com	San Jose State University
May 5	Sandra Abell, Director University of Missouri, Aspects of strong STEM centers.	AbellS@missouri.edu	University of Missouri

Institute Functions at the University of Iowa

The major points of activity and progress at the University of Iowa to date include the following:

1. Involvement with a range of activities related to the development of the Mathematics Transition Guide – a major initiative of the IMSEP program.
2. We have appointed Keith Allison to assist with budget matters, programmatic issues and to assist faculty with implementation of their IMSEP grants.
3. There are currently 4 research projects underway that have been funded by IMSEP.
4. Developed a committee from Physics, Chemistry, Biology and Science Education to develop a 5-year program that would enable students to graduate with a science degree and a masters degree in teaching. At the latest meeting, we are moving to work with the graduate college to finalize the program for the physics program to begin with.
5. The development of a recruitment plan is being undertaken as a critical next step in the new undergraduate/graduate program.
6. The arrangement of a speaking program for second semester is taking shape – the first speaker will be Dr. Recesso who will be leading a one day workshop on the use of web based video analysis tool for examining teaching practice. This work can be used for both research purposes and teaching supervision.



IMSEP Core Projects

Each addresses a consensus challenge of the July 11, 2007, Summit which launched this initiative:

- Shortage of mathematics and science teachers in Iowa;
- Retention of current mathematics/science teachers;
- Awareness of business and industry applications of mathematics and science;
- Quality curriculum for teaching mathematics and science;

- Shortage of community college STEM teachers to meet growing demand for dual credit and community college enrollment.

Real World Externships for Mathematics and Science Teachers

Planning is currently underway to provide Iowa's science, mathematics, and computer teachers with the opportunity to do an externship at a local business or industry. Teachers will earn a professional wage, learn the latest real world applications of their disciplines, be able to tell their students about careers available right here in Iowa and forge lasting relationships with private sector partners. Additionally, extern teachers will productively contribute to the business operation in their hometown! We hope to supplement the IMSEP funds available to the externship by submitting a proposal for additional funding from the National Science Foundation in early 2009.

- Rationale points:
 - About half of all science and mathematics teachers depart from the profession within 5 years, costing U.S. school districts \$7 billion annually.
 - Science and mathematics teachers-in-training get precious little authentic experience in real world occupational settings.
 - The lightening pace of advancement in the private sector cannot be well-represented by teachers isolated in classrooms.
 - School curricula in mathematics and science may not reflect the latest business and industry applications.
 - Iowa's mathematics and science-dependent "new economy" is based on bioscience, advanced manufacturing, and information solutions.
 - The majority of 8th grade mathematics teachers and grade 5 through 9 science teachers nationally do not have majors or major certifications in mathematics or science.
 - Research-based benefits of such programs include more teaching innovation, career awareness, improved student learning, and more deeply committed teachers.
- Key aspects:
 - Summer-long paid "jobs" in research and industry for math and science teachers in their geographic region.
 - Mathematics and science education faculty mentor and assist to translate experience back to school.
 - Academic year meetings maintain support for teachers in application of internship.
 - Facilitations of on-going relations with professional hosts—guest speaking, student job-shadowing, university STEM recruitment.
 - Credit toward licensure for those teaching out-of-field.

I-Teach Mathematics and Science Teacher Recruitment

The I-Teach seminar has been underway at the University of Northern Iowa and Northeast Iowa Area Community College since September and just completed its first semester. Twenty-six (26) and 9 students were registered for the fall recruitment seminar at UNI and NIACC, respectively.

Of those 26 at UNI, 23 have now declared their major to be mathematics teaching or science teaching. Scholarships and learning venue-based internships have been designed and are now in place for those who declare teaching majors. For spring 2009, the seminar is being offered at ISU, as well as UNI and NIACC.

- Rationale points:
 - Response to approximately 10% teacher shortage in science and mathematics (294 open positions in '06-07 of 2,648 secondary public school positions).
 - 93 Iowa physics teachers are eligible for retirement (06-07) while 14 physics teachers graduated from Iowa colleges and universities. Biology teachers eligible to retire = 185, while 85 graduated; in Chemistry the ratio is 116 to 38.
 - Less than 2% of mathematics and science majors at Iowa universities are earning teaching certificates (125 mathematics teaching majors, 113 in science teaching [biology, earth science, physics, or chem.] of approximately 11,500 majoring in STEM fields])
 - Steering our most talented prospects to other STEM fields at the expense of pre-K through 16 teaching is the academic equivalent of eating our seed corn;
 - This is a successful component of the University of Texas' UTeach program that doubled the number of science and mathematics teaching majors at U of T.
- Program key aspects:
 - Creates a financial incentive for talented STEM majors to "taste" teaching (paid learning assistantship).
 - Provides classroom teaching exposure plus mentor conversations with exemplars.
 - Those who shift to a mathematics or science major receive financial and personal support.
 - Targets under-represented populations, rural and urban placements.
 - Relationships developed early in career.

Community College-STEM Instructor Preparation and Updates

Iowa State University has initiated the STEM CC Teaching Certificate and a course will be offered this Spring with all of the courses being offered this summer. We have a brochure which is being produced to highlight this program.

- Rationale points:
 - This was an expressed interest of Community College Presidents at the annual ISU-Community College Summit in May 2007.
 - There are shortages of STEM majors, STEM graduates, and STEM instructors at Community Colleges (Rising Above the Gathering Storm).
 - An increasing number of Iowa college students majoring in STEM fields are getting their start at community colleges.
 - An increasing number of Iowa high school students are earning dual credit in STEM fields at community colleges.
 - ISU already has a "general" community college teaching certification program.

- Key aspects:
 - Launch of a special STEM learning and teaching community college teaching certificate program.
 - Based on general certificate program established in 2001 of approved courses that will be modified.
 - Program is a “blended” delivery of on-site and on-line.
 - Courses include “College Teaching,” “Curriculum Development,” “Diversity in Higher Education.”
 - Serves as template for other CC-certification programs at Regent universities.

- Activities and Actions to date:
 - We have also developed a brochure around our IGS Masters program which allows persons to teach in two STEM areas as well as getting the teaching certificate after completion of the degree.
 - We are in the process of creating a proposal process for CC-STEM instructors to seek professional travel funds to STEM related conference through May 30. We took this idea to the CC CAO's and they loved the proposal
 - We are planning a "Exploring STEM Teaching at the Community College" for all graduate students at UI, UNI and ISU in the Spring term. It will be a one day drive in hosted by Kirkwood. Again the CAOs are excited about this.
 - Also this summer we are offering a BCOOL workshop at no charge for STEM Instructors. It will be team taught by individuals who have worked with Engineering, Mathematics and Biological Sciences here at ISU. The idea is to create a community of outstanding learners focused on STEM.
 - The advisory committee has been formed and will be meeting soon. We have used the CC CAOs as our sounding board until this is active.

Project Lead The Way at Iowa State University and the University of Iowa

- Rationale points:
 - PLTW is a featured “Best Practice” of the National Governors’ Alliance on STEM Education
 - It is a national pre-engineering curriculum package for middle and high school
 - Part of a statewide implementation system of the Division of Community College and Workforce Preparation within the Iowa Department of Education.
 - PLTW integrates academic, technical, and career information.
 - Already successfully introduced by Iowa’s two affiliate colleges of engineering to 49 middle and high schools.

- Key aspects:
 - PLTW-certified engineering faculty train teachers at Iowa high schools and middle schools.
 - Master teachers then certified to lead summer training institutes.
 - Pre-engineering high school courses are introduced—some eligible for college credit.

- Middle school pre-engineering modules are incorporated into science, technology, and mathematics courses.
 - Yearly updates at affiliate universities for teachers, counselors.
- Activities and Actions to date:
- Number of teachers that have attended the Summer Training Institutes

The University of Iowa	Summer 2007	Summer 2008
Principles of Engineering (POE)	12	23*
Biotechnical Engineering (BE)	6	8

Iowa State University	Summer 2007	Summer 2008
Gateway to Technology (GTT)	7	9
Digital Electronics (DE)	6	10
Introduction to Engineering Design (IED)	18	27

**During the Summer of 2008, the University of Iowa was scheduled to host an STI session in June for Principles of Engineering. Unfortunately, that was cancelled due to flooding in the Iowa City area. Except for three participants, all of the teachers were available to attend the UI July STI session.*

- * The University of Iowa trained one professor in Principles of Engineering (POE) this summer and now has a total of three professors trained for the two courses that are hosted at that institution. This includes two professors for POE and one for BE. UI anticipates sending a professor for training in Civil Engineering and Architecture (CEA) in 2009.
- * Iowa State University trained two additional professors this summer and now has four professors trained for the three courses that are hosted there. This included one for Gateway to Technology (GTT) and one in Digital Electronics (DE). ISU anticipates sending a professor for training in Computer Integrated Manufacturing (CIM) in 2009.
- * Iowa State University had a “Master Teacher-in-Training” in 2007 for IED who became a master teacher for the course this summer. Two other “Master Teachers-in-Training” were also hired this summer for IED and GTT. Both were successful in their training, so ISU will employ three Iowa teachers next summer. ISU also has two Iowa-based educators interested in becoming “Master Teachers-in-Training” for DE in the Summer 2009.
- * Summer 2009 Summer Training Institutes:
The University of Iowa anticipates offering POE, BE, and CEA.
Iowa State University anticipates offering IED, DE, GTT, and CIM.

- * Some other facts/figures: college credit

<i>Institution where the credit was requested from:</i>		
	ISU	UI
Academic Year 2005-06	0	49
Academic Year 2006-07	19	184
Academic Year 2007-08	63	332

After students have successfully completed the PLTW courses and subsequent course-end exams, they can apply for college credit.

- * Conferences
 - During the Fall 2007, the University of Iowa hosted a very successful PLTW Counselor’s Conference at The University of Iowa. Over 115 representatives were present. Representation came from school districts, local business and industries, State Department of Education, and other higher-education institutions.
 - During the 2008-09 academic year, University of Iowa hosted the teacher’s conference and student symposium (29 teachers from 21 schools) while Iowa State University hosted the annual counselor’s conference (data table below). The two institutions alternate hosting responsibilities for PLTW-related events.
 - In May 2008, Iowa State University hosted the annual Student Symposium where PLTW participants showcased their work to a panel of judges. Scholarships were awarded to outstanding entries.
 - 2008 Counselor Conference, November 2008



Counselor Conference Attendance Record 2008-2009

Breakdown Analysis										
Location	Counselors	Administrators	Teachers/Students	B & I	University	Presenters	SDOE	CTE	Other	Total
3 Ames, Iowa	66	27	12	0	1	19	1	1	0	127

Please input the total amount of people present for each category. Individual names are not necessary.

Corridor STEM Initiative at AEA 10

The Corridor STEM Initiative focuses most of its energy on the after school programs set up in local elementary and middle schools along the “Technology Corridor”. These after school programs mainly follow a curriculum called “Engineering is Elementary.” Along with this guided curriculum teachers are given resources from the Grant Wood AEA in the form of “kits.” Instructors of this program may also use their own discretion and teach the program based on hands on lessons in the STEM fields that they may have obtained via their own investigation. The CSI program is in its second year of the after school program and overall has seen a large amount of positive feedback from participants and their respective parents. Currently, nine total elementary and middle schools are impacted by this initiative. IMSEP is currently working on extending CSI’s growth to the Cedar Valley.

The current nine (9) Before/After School Programs sites are as follows:

6 ‘Second Year’ grant sites;

- Prairie Middle School – College Community School District
- Prairie Heights/Crest Elementary Schools – College Community School District
- McKinley Middle School – Cedar Rapids Community School District
- Novak Elementary School – Linn-Mar Community School District
- English Valleys Elementary – English Valleys School District
- Hills Elementary School – Iowa City Community School District

3 ‘First Year’ grant sites:

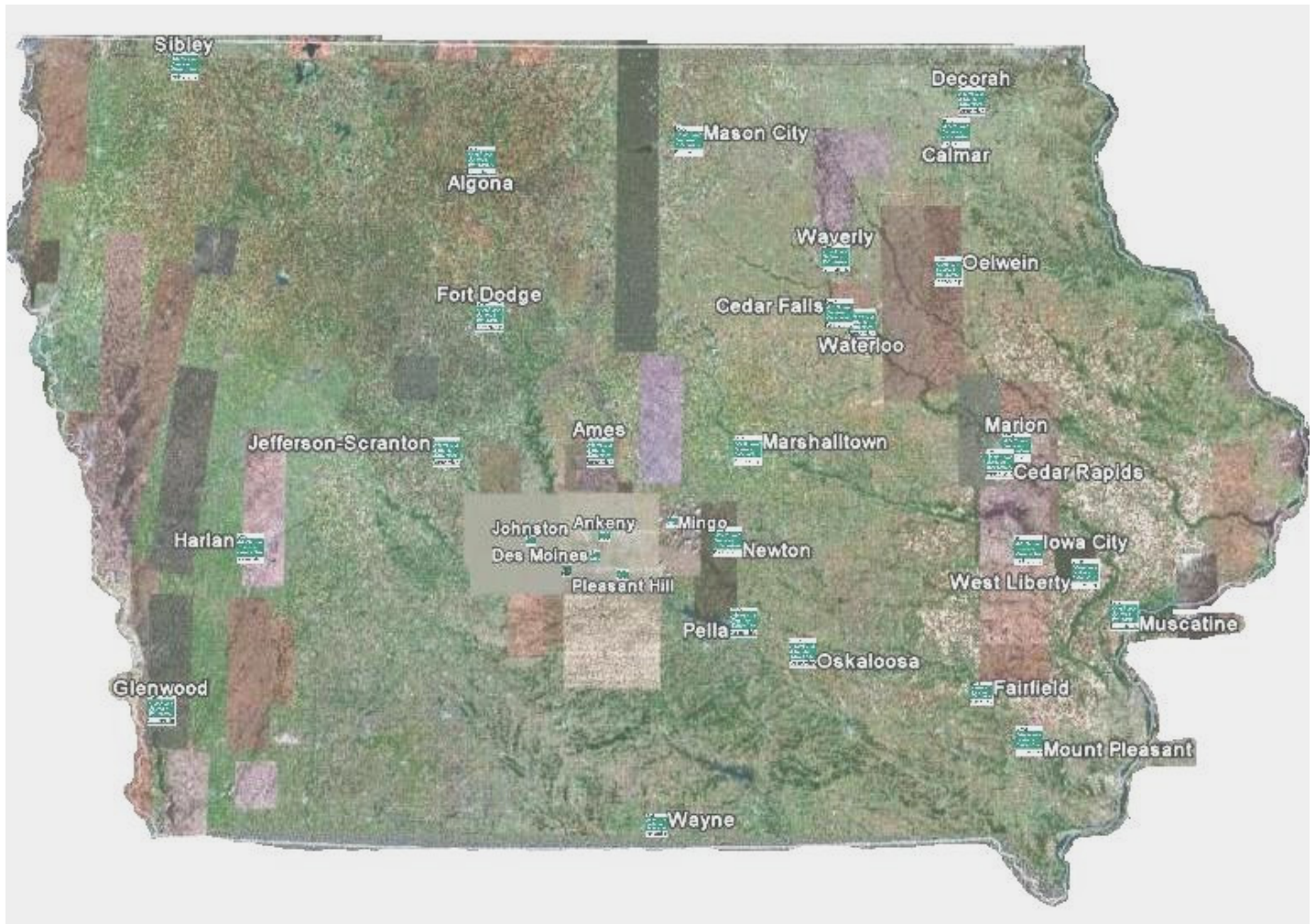
- Grant Wood/Lemme Elementary Schools – Iowa City Community School District
- Lincoln Elementary School – Washington Community School District
- Clear Creek Amana Middle School – Clear Creek Amana School District

Organi- zation	Targeted Students	Contact Person	Curriculum Focus	Primary Instructor(s)	Special Program Considerations/Notes	Meeting Time Frames/ Frequency
Hills Learning Center (gr. 3-5) 2 nd Year	19 female 52 low income 26 minority	Kris Mowatt HLC Director 319-688-1108 mowatt.kris@iccsd.k12.ia.us	EiE Curriculum: The Attraction is Obvious: Designing a Maglev System, Marvelous Machines	Brian Fleck Nathan Baker Kristen Erickson	Inquiry/PALS Plus (Dr. John Dunkhase) Using <i>Inquiry and the National Science Education Stds.</i> (Nat’l. Research Council) Partnership w/ Uof I College of Eng.	3:00 – 5:15 M-F for 12 weeks in the Fall and 16 weeks in the Spring
Novak Elementary School (gr. 3 – 5) 2 nd Year	11 female 15 low income 5 minority	Stacia Dautremont (Elementary Prevention Specialist) 319-447-3337 sdautremont@linnmar.k12.ia.us	Weather, Recycling, Nutrition, Urban Ecology, DNA Extraction	*Stacia Dautremont *Nancy Rinehart *Rachel Morris	Extremely transient population Held at Azure Apts. Adjacent to Novak Elem.	Thursday: 3:00 – 3:45 (6 – 8 incorp. with family mtgs.)
College Community (gr. 3 – 5) 2 nd Year (Prairie Hts, Prairie Crest)	12 female 17 low income 14 minority	Barbara Hilgenkamp STEM Coordinator 319-848-5309 bhilgenkamp@prairiepride.org	*EiE Curriculum – Wind Power, Water, Water Everywhere * GPS Learning opportunities	*Barb Hilgenkamp Robin Hoffman - Extension	Partnership w/Clipper Corp., College of Eng. – Uof I , ISU Extension * Student focuses on area flooding/real world connection.	Instruction/ Field Trips: Tuesday – 3:30 – 5:00 Family Nights – 5:30 – 7:00 Bi-monthly

English Valleys Elementary (gr. 3 – 5) 2 nd Year	30 female 10 – 15 low income 1 minority	Melissa Kingland 319-664-3638 mkingland@english-valleys.k12.ia.us	EiE Curriculum Materials: *An Alarming Idea *-Catching the Wind *Just Passing Through *Best of Bugs	*Melissa Kingland * Jenn Hohen-shell (volunteer)	Partnership w/ Uof I Women in Science and Engineering Primary target =females	3:30 – 5:00 (1x/wk) 4 - Sat. field trips every other month
College Community (gr. 6 – 8) 2 nd Year	At least ½ female At least ½ low income At least ½ minority	Lori Danker K-12 ELP Coordinator 319-848-5310/5344 ldanker@prairiepride.org	Use of GPS in real world applications (mapping campus for wildlife markers)	Lori Danker Matt Erlandson	Partnership w/ Kirkwood and Terry Brase	Monday: 3:25 – 4:30 Field trips some Sat.
McKinley Middle School (gr. 6 – 8) 2 nd Year	Min. of 60 female 50% free/ Reduced 45% minority	Barbara Rhame (Teacher, Program for Academic & Creative Talent) 319-558-1565 brhame@cr.k12.ia.us	Crime Scene Investigation	*Ted Neal *Suzanne Thuecks *Barb Rhame	Serves primarily females in programming	5 modules/6 wk each 2 hr. (1x/week)
Clear Creek Amana School (gr. 6 – 8) 1 st Year	18+ Females 3-5 low income 3-5 minority	DeAnna Kellenberger Teacher dkellenberger@cca.k12.ia.us	*Lego Education Technology & Solutions for Lego Motorized Mechanisms * MINDSTORMS Education Software with Training Missions for Lego Robotics *EiE Curriculum w/female students	DeAnna Kellenberger Creig Dunlap	A 'Girls Support Group' is held for the female attendees that address particular needs of this population	*Thursday-regular group : 3:30 – 5:00 *Girl's support group; Tuesday -- 2 hrs/1x/wk
Lincoln Elementary , Washington, IA (gr. 6 – 8) 1 st Year	176 females 150 low income 68 minority	Nancy Clawson Teacher nclawson@washingotn.k12.ia.us	EiE Curriculum: Marvelous Machines Rube Golberg Curriculum	*Nancy Clawson *Mark Berhow *Julie Timmins	Partnership w/ College of Engineering-Uof I	2x/week for 8 weeks Tuesday & Thursday: 3:20 – 5:20
Lemme/Grantwood Elementary Schools Iowa City, Iowa (gr.3-5) 1 st Year	73 female(Lemme) 120 female (GW) 29 low income (Lemme) 157 low income (GW) 30 minority (Lemme) 143 minority (GW)	John Bacon/Principal – Lemme 319-688-1125 Bacon.John@iccsd.k12.ia.us Kate Callahan/Principal – Grantwood 319-688-1180 Callahan.Kate@iccsd.k12.ia.us	EiE Curriculum: *A Sticky Situation – Designing Walls-Building Walls *Sounds Like Fun: Seeing Animal Sounds *Catching the Wind: Designing Windmills *DNA Extraction *GPS navigation *Robotix Roving on Mars * Rockets Away	*Lisa Hall *John Bacon *ISU Extension Staff	This is a two school partnership that involves large numbers of students Partnership w/ College of Engineering - Uof I	Weds. – 3:30-5:15 (Lemme) Thurs. – 4:30-5:30 (GW)

People and Partnerships

Iowa communities directly engaged in IMSEP activities as of December 2008



Individuals affiliated with IMSEP

University of Northern Iowa

- Allen, Benjamin. *President*
- Beharka, Alison. *Price Laboratory School, Department of Teaching*
- Briggs, Dianna. *Interim Director & Instructor, Office of Student Field Experiences*
- Buzynski, Brenda. *Executive Assistant to the President*
- Callahan, William. *Dean & Professor, College of Education*
- Christensen, Stacey. *Community Relations Manager, University Marketing & Public Relations*
- Countryman, Lyn. *Professor, Price Lab School*
- Degnin, Francis. *Assistant Professor, Philosophy & World Religions*
- Del Carlo, Dawn. *Assistant Professor, Chemistry & Biochemistry*

- Dhanwada, Kavita. *Associate Professor of Biology and IBA Board of Director*
- Duncan, David. *Professor Emeritus, Mathematics*
- Ecker, Mark. *Associate Professor, Mathematics*
- Etscheidt, Susan. *Associate Professor, Special Education*
- Francis, Angela. *Interim Director, Upward Bound Math & Science*
- Geiken, Rosemary. *Coordinator, 2+2 Program & Instructor of Curriculum & Instruction*
- Haack, Joel. *Dean College of Natural Sciences*
- Harwood, William. *Department Head & Professor, Chemistry & Biochemistry*
- Hunzelman, Amy. *Director of Education & Special Programs, Gallagher-Bluedorn Performing Arts Center*
- Hylton, Latricia. *Mathematics, Academic Learning Center*
- Johnson, Nicole. *Instructor, Communication Studies*
- Kleppe, Anita. *Director of Research Services, Office of Sponsored Programs*
- Kueter, Roger. *Coordinator for Community College Communications*
- Lee, Cherin. *Associate Professor, Biology*
- Lubker, Jim. *Interim Provost and VP for Academic Affairs*
- Luze, Kathryn. *Director, College of Natural Sciences Development*
- Miller, Cathy. *Associate Professor, Mathematics*
- Moser, Kristin. *Senior Research Analyst, Institutional Research*
- Mupasiri, Doug. *Associate Professor, Mathematics*
- Patton, Phil. *University Registrar, Registrar's Office*
- Pecen, Recayi. *Associate Professor, Industrial Technology*
- Prophet, Margaret. *Lecturer, Mathematics*
- Rathmell, Edward. *Professor, Mathematics*
- Riehl, Suzanne. *Associate Professor, Mathematics*
- Rule, Audrey. *Assistant Professor, Curriculum & Instruction*
- Rust, Patti. *Senior Associate Registrar, Registrar's Office*
- Shaw, Doug. *Associate Professor, Mathematics*
- Stefanich, Greg. *Professor, Curriculum & Instruction*
- Stevens, Bridgette. *Assistant Professor, Mathematics*
- Stone, Jody. *Professor, Chemistry & Biochemistry, Price Lab School*
- Thiessen, Diane. *Professor, Mathematics*
- Tidwell, Deborah. *Literacy Education, Dept. of Curriculum & Instruction*
- Uhlenberg, Jill. *Interim Department Head & Assistant Professor, Curriculum & Instruction*
- Wilson, Barry. *Assoc Professor, Educational, Psychology & Foundations*
- Yarrow, Jennifer. *Assistant to President for Events & Protocol, President's Office*
- Younie-Suchan, Jennifer. *Graduate Assistant, VP for Student Affairs*
- Zan, Betty. *Interim Director & Associate Professor, Center for Early Developmental Education*

Iowa State University

- Alexander, Roger. *Associate Professor, Mathematics*
- Andre, Thomas. *Professor, Curriculum & Instruction*
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- Bruna, Katherine R. *Assistant Professor, Human Development & Family Studies*

- Bruning, Monica. *Program Manager, Engineering Academic/Student Affairs*
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- Carlson, Sarah. *Program Coordinator, Human Sciences Administration*
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- Colbert, Jim. *Associate Professor, Ecology, Evolution & Organismal Biology*
- Drake, Corey. *Assistant Professor, Curriculum & Instruction*
- Duree, Christopher. *Lecturer, Educational Leadership & Policy Studies*
- Fairchild, Ellen. *Lecturer, Curriculum & Instruction*
- Flora, Jan. *Professor, Sociology*
- Froelich, Amy. *Associate Professor, Statistics*
- Glenn, Kimberly. *Programs Assistant for Precollegiate Programs*
- Greenbowe, Thomas. *Professor, Chemistry*
- Hargrave, Constance. *Center for Technology Learning & Teaching*
- Heaverlo, Carol. *Program Coordinator, Program for Women in Science and Engineering*
- Hegland, Susan. *Associate Professor, Human Development & Family Studies*
- Holme, Thomas. *Professor, Chemistry*
- Johnston, Elgin. *Mathematics Professor*
- Johnston, Gail. *Mathematics Lecturer*
- Jones, Kathleen. *Assistant Vice President for Enrollment and University Registrar*
- Keinert, Fritz. *Associate Professor, Mathematics*
- Kemis, Mari. *RISE*
- Kerns, Karri. *Program Coordinator, Human Development & Family Studies*
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- Lewis, Hannah. *Program Coordinator, Sociology and Sustainable Agriculture*
- Luze, Gayle. *Associate Professor, Human Development & Family Studies*
- Naeve, Linda. *Asst. Director- Connecting Learning and Living Program*
- Nitchals-Reiersen, Robyn. *Program Coordinator, Human Development & Family Studies*
- Norton-Meier, Lori. *Assistant Professor, Curriculum & Instruction*
- Olson, Joanne. *Associate Professor, Curriculum & Instruction*
- Peters, Justin. *Professor, Mathematics*
- Peterson, Carla. *Associate Dean, Human Development & Family Studies*
- Powell, Hilary. *Graduate Assistant, Anthropology*
- Schroeder, Camille. *Manager for Engineering Precollegiate Programs*
- Seymour, Jenna. *Assistant Professor, Math*
- Smith, Carl. *Interim Chair, Professor, Curriculum & Instruction*
- Thompson, Ann. *Professor, Center for Technology Learning & Teaching*
- Toering, Janet. *Director - Connecting Learning and Living Program*
- Zachary, Loren. *Assistant Dean, Engineering*
- Zunkel, Karen. *Director, Undergraduate Support Services, Office of the Executive Vice President & Provost, Director, Program for Women in Science and Engineering*

University of Iowa

- Alonzo, Alicia C. *Assistant Professor, Science Education*
- Anderson, Dan. *Professor, Mathematics*
- Brus, Chris. *Director, Women in Science and Engineering*

- Burketta, Vicki. *Clinical Associate Professor, Department of Teaching and Learning*
- Darcy, Isabel. *Associate Professor, Mathematics*
- David, Marcella. *Professor, Law & International Studies, Special Assistant to the President for Equal Opportunity & Diversity*
- Durumeric, Oguz. *Associate Professor, Mathematics*
- Fi, Cos. *Assistant Professor, Education*
- Finnerty, Diane. *Coordinator of Faculty Development Programs, Office of the Provost*
- Hand, Brian. *Professor, Teaching and Learning*
- Kruckeberg, Tom, *Applications Developer and Supervisor, Office of the Registrar*
- Lenth, Russ. *Professor, Statistics and Actuarial Science*
- Lockwood, Larry. *Assistant Provost for Enrollment Services and University Registrar*
- Park, Soonhye. *Assistant Professor, Science Education*
- Pienta, Norbert. *Associate Professor, Chemistry; Director, University of Iowa Center for Teaching*
- Rethwisch, David. *Professor, Chemical and Biochemical Engineering*
- Roseman, Dennis. *Professor, Mathematics*
- Russo, Ralph. *Professor, Statistics and Actuarial Science*
- Seaman, Walter. *Associate Professor, Mathematics*
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- Stroyan, Keith. *Professor, Mathematics*
- Sunstein, Bonnie. *Professor, English*
- Tymoczko, Julianna. *Assistant Professor, Mathematics*
- Whitaker, Rebecca. *K12 Coordinator, College of Engineering*

Teacher/Schools

- Adams, Barbara. *Mathematics Coordinator, Des Moines Public Schools*
- Bahlmann, Micky Kingery. *Principal, Margaretta Carey Elementary School*
- Balong, Megan. *Instructor, Price Lab School*
- Brcka, Greg. *Teacher, Northview Middle School*
- Cain, Kacia. *Teacher, Des Moines Public Schools*
- Carlile, Crista. *Science Curriculum Coordinator, Des Moines Public Schools*
- Corkrean, Jennifer. *Teacher, Nathan Weeks MS*
- Craig, Kay. *Teacher, Ames Middle School*
- Dixon, Janet. *Teacher, Ames Middle School*
- Ernst, Lowell. *Director of Instruction, Pella Community School District*
- Eveland, Joyce. *Teacher, Oskaloosa High School*
- Flinspach, Sharon. *Teacher, Fairfield High School*
- Halupnik, Dirk. *Executive Director of Instructional Services, Linn-Mar Community Schools*
- Haluska, Michael. *Superintendent, Decorah Community Schools*
- Herzberg, Jeff. *Superintendent, Sibley-Ocheyedan Community School District*
- Hines, Jeffery. *Science Teacher, Mason City High School*
- Hommer, Jamie. *Teacher, Southeast Polk Junior HS*
- Hunsicker, Arthur. *Teacher, Geometry, Revere High School, MA*
- Jurgensen, Elizabeth 'Liz' Fischer. *Director of Special Education, Ames School District*
- Kaster, Bryan, *Teacher, Harlan High School*
- Kohagen, Chad. *High School Principal, Oelwein Schools*

- Kohlhass, Daryl. *Teacher, Bishop Garrigan Schools*
- Kohlhass, Kathy. *Teacher, Seton Grade School*
- Krusi, Jean. *Teacher, Ames Middle School*
- Lee, Debbie. *District Curriculum Coordinator, Waterloo Community School District*
- Machen, Rebecca. *AP Calculus Teacher, Muscatine High School*
- Maltas, James. *Instructor, Price Lab School*
- Marter, Jim. *Teacher, Newton High School*
- Meier, Mary. *Educator, Waterloo Community School District*
- Newland, Shari. *Science Teacher, Muscatine High School*
- Niehaus, Jill. *Teacher, Southeast Polk High School*
- Patera, Jim. *Superintendent of Schools, Oelwein Community School District*
- Rabengerg, Tabby. *Dean of Students Des Moines Central Academy*
- Ross, Cheri. *Math Teacher, Mason City Community School District*
- Ruden, Matt. *Teacher, Colfax-Mingo Middle School*
- Schladweiler, Kathryn. *Director of Instructional Programs, Mason City Community School District*
- Selking, Lynn. *Teacher, Wayne High School*
- Sibley, Stan. *Superintendent, Glenwood Schools*
- Smith, Dave. *Director, Price Laboratory School*
- Stevenson, Lisa. *Curriculum Director, West Liberty Community School District*
- Stoakes, David. *Superintendent, Cedar Falls Community Schools*
- Strike, Rich. *Math Teacher, Cedar Falls High School*
- Temeyer, Michelle. *Director of Community Education, Waterloo Community Schools*
- Tvrdik, Deb. *Teacher, Fort Dodge Senior High*
- Van Gilder, Jean. *Teacher, Jefferson-Scranton CSD*
- Wagner, Kristy. *High School Associate Principal, Mason City Community School District*
- Walker, Joye. *Teacher, Iowa City West High School*
- Whitehead, Dick. *IMSEP Advisory Council and Superintendent, College Community School District*
- Wiley, Martha. *Teacher, Mount Pleasant High School*

Community Colleges

- Barnhart, Leroy. *Instructor, Mathematics, Kirkwood Community College*
- Bottrell, Cynthia. *Dean of Arts and Sciences, Hawkeye Community College*
- Ehresmann, Julie. *Science Instructor Biotechnology/Biofuels, Iowa Central Community College*
- Jason Friday, *Biology, North Iowa Area Community College*
- McCoy, Norm. *Program Coordinator, Entrepreneurial & Diversified Agriculture, Marshalltown Community College*
- Wills, Penny. *President, Northeast Iowa Community College*
- Wilson, Sally. *Associate Professor – Biology, ISU/Marshalltown Community College*

Other Colleges

- Briggs, Derek. *Chair, Research and Evaluation Methodology, University of Colorado, Boulder*
- Busta, Maureen. *Professor, Mathematics, Upper Iowa University*
- Gerlovich, Jack. *Professor, Education, Drake University*
- Hart, Eric. *Associate Professor, Mathematics, Maharishi University*
- Lauffer, Dan. *Professor, Outreach Program Manager School of Education, University of Wisconsin-Madison*
- Loch, Sergio. *Professor, Mathematics, Grandview College*
- Recesso, Arthur. *Associate Research Scientist, Education, University of Georgia*
- Schaffer, Karl. *Instructor, Mathematics, DeAnzo College*
- Stern, Erik. *Professor, Performing Arts, Weber State University*

Department of Education and AEAs

- Jeffrey, Judy. *Director*
- Kathy McKee, *Science Consultant*
- Judith Spitzli, *Mathematics Consultant*
- McCulley, Yvette. *Science Consultant*
- McGuire, Ken. *Consultant*
- Reese, Jim. *Bureau Chief*
- Schenk, Tom. *Consultant*
- Varner, Jeremy. *Consultant*
- Bancroft, Jeanne. *Coordinator, GWEAE VAST Center*
- Breitsprecker, Corrine. *AEA 11*
- Dubishar, Susan. *Educator, AEA 10*
- Newsum, Bob. *Iowa Core Curriculum Consultant, AEA 14*

Business and Industry

- Budnick, Michael. *Board of Directors, Iowa Biotechnology Association*
- Burt, Suzanne. *Human Resources Director, Wheaton Franciscan Healthcare*
- Campbell, Jeannie. *Assistant Director of Education, Iowa Public Television*
- Cohen, Jordan. *Board of Director, Iowa Biotechnology Association*
- Darrah, Cary. *General Manager, Tech Works*
- Dietz, Cindy. *Senior Manager of Community Relations, Rockwell Collins*
- Fehr, Walt. *Board of Director, Iowa Biotechnology Association*
- Erlacher, Mary Lou. *Director, Workplace Learning Connection*
- Gallagher, Melinda. *Educational Outreach Coordinator, Iowa Public Television*
- Getter, Doug. *Executive Director, Iowa Biotechnology Association*
- Geyerman, Randy. *Board of Director, Iowa Biotechnology Association*
- Hobson, Tom. *Senior Manager of Government and Public Affairs, Rockwell Collins*
- Hutcheson, Todd. *Human Resources Director, Rockwell Collins*
- Juon, Dave. *John Deere, Waterloo Works*

- Kulesher, Kate. *Board of Director, Iowa Biotechnology Association*
- Lorenzo, Mark. *Board of Director, Iowa Biotechnology Association*
- Otis, Darcy. *General Manager, Siemens*
- Pace, Valerie. *West Regional Manager for Corporate Citizenship and Corporate Affairs, IBM*
- Radosevich, Dr. Jennifer. *Board of Director, Iowa Biotechnology Association*
- Ralston, Mike. *Executive Director, Iowa Association of Business and Industry*
- Rucker, Mike. *Board of Director, Iowa Biotechnology Association*
- Schisler, Dave. *Board of Director, Iowa Biotechnology Association*
- Smith, Elliott. *Executive Director, Iowa Business Council*
- Stroburg, Jeff. *Board of Director, Iowa Biotechnology Association*
- Swegle, Tom. *Board of Director, Iowa Biotechnology Association*
- Terrill, Roman. *Board of Director, Iowa Biotechnology Association*
- Thorn, Sarah Fiedler. *Board of Director, Iowa Biotechnology Association*
- Tierney, Dave. *Board of Director, Iowa Biotechnology Association*
- Westman, Martin. *Pella Corporation*
- Winter, John. *John Deere Retired*

Other Associates

- Barron, Randy. *Chair, New Mexico Alliance for Arts and Education*
- Bisgaard, Linda. *Collaborations & Advocacy Director, Girls Scouts of Iowa*
- Boyd, Kimberli. *Artistic Director, "Dancing Between the Lines"*
- Cobb, Mary Jane. *Executive Director, Iowa State Education Association*
- Crews, Jon. *Mayor, City of Cedar Falls*
- Draft, Marcia. *National Workshop Leader, John F. Kennedy Center for Performing Arts*
- Dust, Steven. *Executive Director, Greater Cedar Valley Alliance*
- Gibbins, Paul. *UBMS Assistant Director, Central College*
- Gonzalez, Diana. *Academic Officer, Board of Regents - State of Iowa*
- Hardcastle, Dan. *President, IGEMS Partners (Inspiring a Generation of Engineers, Mathematicians, and Scientists)*
- Heaverlo, Carol. *Women in Science and Engineering*
- Heckroth, William. *State Senator*
- Jacobson, Leann. *President, Technology Association of Iowa*
- Jourdan, Alissa. *Director, Discovery Research and Worldwide Research and Development Coordinator, Kemin*
- Miles, Eric. *Energy Consultant*
- Murray, Marge. *American College Testing*
- Nuñez, Jon. *Assessment and Retention Specialist, Iowa Valley Continuing Education*
- Oleson, Vicki. *Director, Project SOAR*
- Rice, Ron. *Executive Director, Iowa Association of School Boards*
- Roghair, Rick. *Sherwood Forest Grants/Consulting*
- Ross, Cheryl. *President, ICTM*
- Rubak, Chad. *University of Iowa Health Care*
- Schon, Mary. *Scientist, New Initiatives, Krell Institute*
- Scott, Rachel. *Division Administrator, Iowa Commission on the Status of Women*
- Simmon, Rob. *Vice President, IGEMS Partners (Inspiring a Generation of Engineers, Mathematicians, and Scientists)*
- Stocker, Charlene. *Retired Teacher/School Board Member*
- Thornton, Jim. *Coordinator. CSI, Corridor STEM Initiative*
- Tymeson, Jodi. *State Representative*

- Umsted, Nancy. *School Board Member*
- Van Gorp, Stacy. *Executive Director, R.J. McElroy Trust*

- Wesemann, Martin. *Director of Corporate Engineering, Pella Corp.*

SECTION III: Evidence to Objectives

1. Double the number of Pre-K through 12 and community college mathematics and science teachers produced by Iowa universities in three to five years.

- *Core Projects that meet this objective:*
 - **Community college STEM**
 - * The CC–STEM project directly addresses the shortages of mathematics and science instructors at community colleges through a community college teaching certificate program.
 - **I-Teach Recruitment Program.**
 - * Student participation in a seminar course exploring teaching aims to increase the number of mathematics and science teachers produced by the Regent universities by encouraging more STEM majors to enroll in the teacher preparation programs across the state.
- *Competitive Grants that meet this objective:*
 - **Seamless Transitions for Science Teacher Education, Joanne Olson**
 - * The focus of the project is to recruit science teachers through a series of workshops held at the Regents Universities.
 - **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * This proposal will bring together committed educators to improve the educational experience for all students with a focus on those with disabilities. Better preparing teachers to work with diverse populations will decrease teacher burn-out and encourage others to enter the field.
 - **Traveling Parallel Lines, Bonnie Sunstein**
 - * High school students will explore their mathematical thinking through writing to a partner in another place hopes to spark the connection between writing and mathematics, link geometry concepts to the outside world, and encourage our students to choose mathematics or science or teaching as a profession.

2. Improve the performance of Iowa Pre-K through 16 students in mathematics and science courses.

- **Mathematics Transition Guide**

- * Many Iowa students struggle with the transition from high school to university mathematics study. This guide was produced by an assembly of high school teachers and university mathematics faculty to aid students in successfully navigating the transition and improving performance mathematics coursework.

- *Core Projects that meet this objective:*

- **Real-world Teacher Externship Program**

- * The focus of this project supports STEM majors, highly knowledgeable in STEM content, to view teaching as a career options which will in turn positively impact they students they teach and will be reflected in improved performance.

- **Project Lead The Way**

- * This project provides a curriculum for middle and high school students to learn science and mathematics through engineering applications.

- *Competitive Grants that meet this objective:*

- **Improving Chemistry Teaching in Iowa, William Harwood**

- * The project will conduct workshops that will focus on increasing the ability of chemistry teachers in the areas of guided inquiry strategies and lab practices, in turn improving the performance of students impacted by these teachers.

- **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**

- * A main area of focus to be addressed at the working conference.

- **Learning Progressions to Support Science Teaching & Learning, Alicia Alonzo**

- * The 'Learning Progressions' that will be used in this project have the potential of significantly impacting the way students learn science.

- **EMPOWERR, Walter Seaman**

- * The project will deliver over 100 hours per year of mathematics content and lesson study training to three GWAEA elementary schools, in turn improving student performance at these locations.

- **Traveling Parallel Lines, Bonnie Sunstein**

- * The project aims to link writing and mathematics and to better understand how language affects students understanding of mathematics. By finding out how students understand mathematics this project can help improve how students perform in mathematics.

3. Enhance collaboration among the Regent institutions, community colleges, Pre-K through 12 systems, governmental bodies and private sector interests with the State of Iowa.

- **Science Center of Iowa**
 - * IMSEP was a co-sponsor, with Principal Financial Group and Ford Motor Company, of the traveling robotics exhibit at the Science Center of Iowa.

- **Iowa STEM Education Public-Private Partnerships Symposium**
 - * The Symposium held on December 2, 2008, was successful in registering 37 private sector business and industry association representatives, 92 educators from AEAs, K-12 schools, community colleges, universities and educational associations across the state of Iowa, and 4 Iowa legislators to encourage and promote collaboration.

- *Core Projects that meet this objective:*
 - **Real World Externship Program for Mathematics and Science Teachers**
 - * This internship program will encourage collaboration between Pre-K through 12 educators and the private sector by placing teachers in private sector business and industry across the state for a 5-8 week internship during the summer.
 - **Project Lead The Way**
 - * This project is part of a statewide implementation system of the Division of Community College and Workforce Preparation within the Iowa Department of Education.
 - **Community College STEM Instructor Preparation**
 - * Iowa State University and community colleges across the state are collaborating on a special STEM learning and teaching community college teaching certificate program.
 - **I-Teach Mathematics and Science Teacher Recruitment Program**
 - * Regent institutions and community colleges are working together to recruit more STEM majors into the teaching profession. Local K-12 school systems are involved in this program by hosting the students for observation and teaching short lessons.

- *Competitive Grants that meet this objective:*
 - **RAISE & RET, Dawn Del Carlo**
 - * The project is based on an already developed relationship between private sector businesses and Pre-K through 12 systems, established through the Regents Universities.
 - **Improving Chemistry Teaching in Iowa, William Harwood**

- * The three Iowa Regents Universities will collaborate on meeting the goals of this project.
 - **Teachers' Circle for Central Iowa Middle School Math Teachers, Elgin Johnston**
 - * The goal of this project is to establish a regular meeting of central Iowa teachers involved in Pre-K through 12 systems mathematics.
 - **Seamless Transitions for Science Teacher Education, Joanne Olson**
 - * The development of a workshop series within this project will bring together Pre-K through 12 system teachers in collaboration in their attempt to improve science education.
 - **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * A main area of focus to be addressed at the two-day working conference that will bring together people from various areas in collaboration in their efforts to accommodate/support students with disabilities that are interested in the STEM fields.
 - **Traveling Parallel Lines, Bonnie Sunstein**
 - * The project is based on an established relationship between two Pre-K through 12 systems in Iowa and Massachusetts to learn how students understand mathematics.
- 4. Improve the content and pedagogical knowledge of Iowa mathematics and science teachers Pre-K through 12, community college and the Regent universities.**
- *Core Projects that meet this objective:*
 - **Real World Teacher Externship Program**
 - * Teachers will acquire an increased content knowledge and real-world application of their discipline by participating in a summer internship in Iowa businesses and industry.
 - **Community College STEM Instructor Preparation**
 - **I-Teach Mathematics and Science Teacher Recruitment Program**
 - *Competitive Grants that meet this objective:*
 - **RAISE & RET, Dawn Del Carlo**
 - * The project places Pre-K through 12 teachers in research experiences which enhance their understanding of certain topics, in turn improving their content and pedagogical knowledge on this subject.
 - **Improving Chemistry Teaching in Iowa, William Harwood**
 - * The project will conduct workshops that will focus on increasing the ability of chemistry teachers in the areas of guided inquiry strategies and lab practices.

- **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * Addressed by providing resources and a platform to assist teachers in an area where they feel marginally prepared.
- **Learning Progressions to Support Science Teaching & Learning, Alicia Alonzo**
 - * The learning progressions in which this project is based upon give a promising framework for how students learn science and methods for teaching and assessing science. These learning progressions often have been seen as providing coherence to the curriculum in which the teachers use.
- **Improving High School Biology Teachers' Pedagogical Content Knowledge Using a Web-Based Video Analysis Tool, Soonhye Park**
 - * The project will continually work on professional development with cooperating teachers, which will be enhanced by the usage of a web-based video analysis tool which will heighten the ability to reflect on teaching methods.
- **EMPOWERR, Walter Seaman**
 - * The project will deliver over 100 hours per year of mathematics content and lesson study training to three GWAEA elementary schools.
- **Traveling Parallel Lines, Bonnie Sunstein**
 - * This project's emphasis on action research, hybrid methods, cross-curricular pedagogy, and writing, would not only improve both content and pedagogical knowledge, but it will surely add to the professional publication and presentation possibilities for Iowa teachers,
 - * The project aims to link writing and mathematics and to better understand how language affects students understanding of mathematics. By finding out how students understand mathematics this project can help improve how mathematics is taught.

5. Increase the ethnic, racial and socioeconomic diversity of mathematics and science teachers in Iowa.

- **Women/Minorities in STEM Report**
- *Core Projects that meet this objective:*
 - **I-Teach Mathematics and Science Teacher Recruitment Program**
- *Competitive Grants that meet this objective:*
 - **The Carmen Sosa Farming Curriculum Project, Katherine Bruna**
 - * The main audience impacted by this project is culturally and linguistically diverse youth in the state of Iowa.
 - **Iowa Math & Science Academy, Angela Francis**

- * This project focuses on generating the proper skills and motivation in 40 low income first generation minority students to succeed in a post secondary STEM field.
- **Learning Mathematics and Science through the Arts, Amy Hunzelman**
 - * This project will hold mathematics and science workshops through the Multicultural Future Teacher Academy in Waterloo, in attempts to encourage a career in education.
- **Seamless Transitions for Science Teacher Education, Joanne Olson**
 - * With the idea of recruiting students into STEM education fields as the main goal of this project. Along with this, the project while attempt to also draw in ethnically, racially, and socioeconomic diverse populations.
- **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * A main area of focus to be addressed at the working conference.
- **Improving High School Biology Teachers' Pedagogical Content Knowledge Using a Web-Based Video Analysis Tool, Soonhye Park**
 - * The main goal of this project is to prepare high quality science teachers for Iowa schools. Within this goal the project is aware of Iowa's changing demographics and the influx of culturally diverse populations. With this in mind this project will reach out to culturally diverse students as well.
- **Traveling Parallel Lines, Bonnie Sunstein**
 - * Plans for a summer institute will attract potential math teachers from more diverse ethnic, racial, or socioeconomic populations.

6. Increase the quality and quantity of science and mathematics coursework available to students Pre-K through 12 and at community colleges.

- **Mathematics Transition Guide**
- *Core Projects that meet this objective:*
 - **Project Lead The Way**
 - **Real World Teacher Externship Program**
 - * Teachers will experience and participate in real-world applications of their discipline during the internship program and will be able to incorporate these experiences in their classroom curriculum to broaden the available coursework to students.
- *Competitive Grants that meet this objective:*
 - **Seamless Transitions for Science Teacher Education, Joanne Olson**
 - * The workshop series within the project focuses on addressing science teaching practices and assisting beginning teachers in these practices.

- **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * A main area of focus to be addressed at the working conference.
- **EMPOWERR, Walter Seaman**
 - * The project will deliver over 100 hours per year of mathematics content and lesson study training to three GWAEA elementary schools, improving the mathematics coursework available.

7. Increase the number and diversity of students who major in mathematics and science fields at Iowa's Regent universities.

- **Women/Minorities in STEM Report**
- *Core Projects that meet this objective:*
 - **Project Lead The Way**
 - **I-Teach Mathematics and Science Teacher Recruitment Program**
- *Competitive Grants that meet this objective:*
 - **Improving Chemistry Teaching in Iowa, William Harwood**
 - * The project will conduct workshops that will focus on increasing the ability of chemistry teachers in the areas of guided inquiry strategies and lab practices, in turn improving the performance of students impacted by these teachers and making students more likely to major in STEM fields.
 - **Improving Math Instruction in Pre-K Classrooms, Susan Hegland**
 - * The project will focus on improving Pre-K mathematics instruction which will attempt to impact young students by sparking interest and placing them on a path towards a possible STEM major.
 - **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * The project will accommodate/support students with disabilities that are interested in the STEM fields, by doing so making it possible for these students to major in STEM areas and will be a main area of focus to be addressed at the working conference.
 - **Improving Science Instruction in Pre-K Classrooms, Betty Zan**
 - * The project will focus on improving Pre-K science instruction which will attempt to impact young students by sparking interest and placing them on a path towards a possible STEM major.

8. Decrease the number of unlicensed mathematics and science teachers in Iowa.

- *Core Projects that meet this objective:*
 - **Community college STEM**

- *Competitive Grants that meet this objective:*
 - **Improving Chemistry Teaching in Iowa, William Harwood**
 - * This project plans to develop and deliver 4-day workshops on inquiry based laboratory experiences and an ICN course on inquiry teaching.
 - **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * This proposal addresses the differentiation element of the National Science Teacher Standards and aims to prepare teachers to serve students with disabilities and to differentiate instruction for all diverse learners.
 - **Traveling Parallel Lines, Bonnie Sunstein**
 - * Graduate credits offered to participating teachers in this pilot, and in a subsequent summer institute, it is possible to decrease the gaps in licensing.

9. Decrease the attrition rate for mathematics and science teachers in Iowa.

- *Core Projects that meet this objective:*
 - **Real World Teacher Externship Program**
 - **Project Lead The Way**
 - **Community College STEM Instructor Preparation**
 - **I-Teach Mathematics and Science Teacher Recruitment Program**
- *Competitive Grants that meet this objective:*
 - **The Carmen Sosa Farming Curriculum Project, Katherine Bruna**
 - **RAISE & RET, Dawn Del Carlo**
 - * This project aims to establish and provide a supportive network of teachers and university faculty and staff—all of whom have the same goal of improving the quality of STEM education.
 - **Improving Mathematics Instruction in Pre-K Classrooms, Susan Hegland**
 - * College credit granted for participation in the professional development programs established by this project.
 - **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * Addressed by providing resources and a platform to assist teachers in an area where they feel marginally prepared.
 - **Traveling Parallel Lines, Bonnie Sunstein**
 - * Graduate credits offered to participating teachers in this pilot, and in a subsequent summer institute, it is possible to decrease attrition rate.

10. Leverage taxpayer investment in mathematics and science education.

- *Core Projects that meet this objective:*

- **Real World Externships Program for Mathematics and Science Teachers**
- *Competitive Grants that meet this objective:*
 - **Improving Chemistry Teaching in Iowa, William Harwood**
 - * This project will seek additional funds through federal grant application.
 - **EMPOWERR, Walter Seaman**
 - * This project utilizes funds from Title II A, administered by the state of Iowa's Board of Regents.
 - **Learning Progressions to Support Science Teaching & Learning, Alicia Alonzo**
 - * This project is receiving funding from the University of Iowa's Department of Teaching and Learning.
 - **Iowa Student STEM Symposium, Lyn Countryman**
 - * This project is receiving additional funds from the Iowa Math & Science Coalition
 - **Improving Mathematics Instruction in Pre-K Classrooms, Susan Hegland**
 - * This program will seek additional funding.
 - **MSETI – Recayi Pecan**
 - * The Industrial Technology Department at the University of Northern Iowa has provided funds to support this program.
 - **Learning Math & Science through the Arts, Amy Hunzelman**
 - * This program will seek additional funding.
 - **Planning for Success in STEM for Students with Disabilities, Greg Stefanich**
 - * Collaborative resources of MIDWEST and other members of the Regional Alliance on Disability, which facilitate mentorship, internship and work opportunities in both government laboratories and private sector employers for students with disabilities, will be leveraged.

Section IV: Examples of Other State STEM Initiatives

A review of the status of these programs as of January 14, 2009, finds that despite great economic turbulence among these states, available information indicates that STEM education programs are being kept intact.

State	Title	Budget
Alabama	Alabama Math, Science and Technology Initiative	\$41 M for fiscal year 2008?
Colorado	WIRED Initiative	\$15M over 4 years by US Department of Labor
Florida	Florida Partnership to Rejuvenate & Optimize Mathematics and Science Education (PROMiSE)	\$8M per year for 3 years
Georgia	Partnership for Reform in Science and Mathematics	\$34.6M over 5 years
Indiana	Southwestern Indiana Science Technology Engineering and Mathematics Initiative	\$1.2M from NSF
Louisiana	Louisiana Systemic Initiatives Program (LaSIP)	\$12.5M over 5 years
Maryland	STEM Education	\$4.8M divided to counties
Nebraska	Center for Science, Mathematics & Computer Education (CSMCE)	\$9.3M and \$5M for two different programs within CSMCE
Ohio	Ohio STEM Learning Network	\$200M over 2 years
Pennsylvania	Pennsylvania STEM Initiative	\$500,000 from NGA*, \$500,000 from State
Tennessee	Tennessee Mathematics, Science, and Technology Education Center	\$6.2M from various contributors
Texas	Texas Science, Technology, Engineering & Mathematics Initiative (T-STEM)	\$71M (over several years)
Virginia	Virginia Tech's Science Technology Engineering and Mathematics K-12 Outreach Initiative	\$124M for AY 2007-2008

SECTION V: Horizon

IMSEP seeks to progress on the five-year plan by increasing funding to \$6.5 million for FY2010. Additional funds permit the full implementation of core projects and their replication at additional sites for increased impact. Expansions of projects, originations of other commitments (for example, science transitions, alternate licensure), and adoption of a full suite of functions of the Institute (policy advisory, curricular revisions, faculty professional development, teacher preparation standardization, etc.) are on the horizon for FY2010 with adequate funding.

Underpinning all reform-oriented activities of the Institute is the expansion of research/evaluation studies of program effectiveness. Capitalizing on an advantage of top tier research universities connected to IMSEP, research study of effective practices and program effectiveness must be used to inform and steer programs.

A vital function for achieving Goal 1, which is *to improve mathematics and science performance of Iowa students*, will be distance education opportunities for students in mathematics and science. In “leveling the playing field” for Iowa students of mathematics and science across geographic and demographic ranges, a blended delivery model is envisioned by faculty in partnership with teachers using the ICN, internet, and place-based instruction. The Institute will direct the establishment of specialist degrees in elementary school mathematics and science education. Evidence is undeniable that the elementary mathematics and science learning experience is pivotal to future coursework and career decisions. These new degrees will prepare desperately needed elementary school leaders in STEM fields.

Formal education is but one venue of influence. The Institute intends to build informal mathematics and science education and adult education opportunities—a process already initiated through a partnership with the Science Center of Iowa. Home and community support is integral to the recovery of Iowa’s mathematics and science education leadership. Evening, weekend, and summer science and mathematics encounters at museums, zoos, nature centers, malls, businesses, and other venues will multiply the effect of Pre-K through 16 reform.



a collaboration of the University of Northern Iowa, Iowa State University and the University of Iowa

A dynamic and rapidly growing team of professionals has joined together to reclaim Iowa's standing as a national and international leader in mathematics and science education. In its first few months, the Iowa Mathematics and Science Education Partnership has successfully launched four core programs plus an array of competitively-funded projects all centered on improving Pre-K through 12 and post-secondary mathematics and science, while creating an infrastructure for coordination and leadership. From here, the team will build upon pilot successes to expand the IMSEP reach and to progress toward the promise of world-class mathematics and science education for Iowans.

