

# UNIVERSITY OF HAWAI‘I SYSTEM ANNUAL REPORT



REPORT TO THE 2009 LEGISLATURE

REPORT ON STEM PROFESSIONAL DEVELOPMENT PROGRAM

AND

STATUS ON THE TRANSITION TO TEACHING PROGRAM

ACT 111, SLH 2007 (Section 15 & 18)

November 2008

**REPORT TO THE HAWAI‘I LEGISLATURE**  
The Implementation of the STEM Professional Development Programs  
and  
The Status of the Transition to Teaching (TTT) Program

PREPARED BY  
DONALD B. YOUNG, INTERIM ASSOCIATE DEAN FOR ADMINISTRATION  
COLLEGE OF EDUCATION

Act 111 enacted by the 2007 Hawai‘i State Legislature includes two sections relevant to this report. The first relates to professional development for teachers in science, technology, engineering, and mathematics. The second section relates to recruiting and retaining STEM teachers

**Act 111 PART VII**

*SECTION 15. (a) There is established within the University of Hawai‘i a professional development program to provide practicing elementary, middle, and high school science and mathematics teachers with opportunities to increase their knowledge and understanding of recent developments in science, technology, engineering, and mathematics. The professional development program shall be administered by the University of Hawai‘i college of education and shall be open to both certificated and non-certificated teachers. Design of the professional development program shall include evaluation of best practices in other school jurisdictions.*

*(b) Recognizing that the year-round public school calendar has shortened the summer period, that not all schools are on the same academic calendar, and that programs throughout the year, offered in a variety of formats, would facilitate immediate implementation in the classroom, the professional development program shall provide a variety of options designed to meet the specific needs of Hawai‘i’s teachers, which may include summer institutes, a combination of summer, after school, or weekend institutes, distance learning through video conferencing or other mechanisms, neighbor island locations, or other options.*

*(c) The University of Hawai‘i college of education shall submit a report to the legislature, no later than twenty days prior to the convening of the regular session of 2009, on its implementation of the professional development program in the science, technology, engineering, and mathematics disciplines for teachers, including the number of teachers who have participated in the program.*

The Legislature appropriated \$175,000 in each year of the biennium to the University of Hawai‘i to support activities in Section 15.

**Act 111 Part VIII**

*SECTION 17. The legislature finds that there is a chronic shortage of science and mathematics teachers. The recruitment of potential science, technology, engineering, and mathematics*

*teachers for post baccalaureate certificate programs is difficult, but providing the incentive of stipends for individuals to participate in such programs has proven to be effective.*

*The federal Transition To Teaching program is a successful recruitment program that provides stipends as incentives for people who hold degrees in science, technology, engineering, and mathematics subjects to obtain their teaching certificates through the University of Hawai'i's post baccalaureate certificate in secondary education program. The program has resulted in ninety new qualified mathematics and science teachers since it began four-and-a-half years ago. The program is currently funded under the United States Department of Education's Transition To Teaching program, but the University of Hawai'i's transition to teaching grant will expire in 2008. The purpose of this part is to appropriate funds to allow the program to continue.*

*SECTION 18. The University of Hawai'i shall submit a report to the legislature, no later than twenty days prior to the convening of the regular session of 2009, on the status of the transition to teaching program, including the number of individuals who have participated in and completed the program.*

The Legislature appropriated \$175,000 in each year of the biennium to the University of Hawai'i to support activities in Section 18.

## **The Implementation of the STEM Professional Development Programs**

### **2007–2008 Fiscal Year Accomplishments**

While \$175,000 was appropriated by the Legislature to provide professional development in STEM areas, the funds were not released until March 2008, thus significantly limiting the College's ability to accomplish the intended purpose.

Faculty in the Curriculum Research & Development Group (CRDG) of the College of Education drew upon their extensive expertise in designing and providing STEM professional development, the National Staff Development Council standards for teacher professional development, findings and recommendations from teacher professional development research as reported by the National Research Council, and the National Institute for Science Education publication *Designing Professional Development for Teachers of Science and Mathematics* to create STEM professional development initiatives. The institutes provided and expenditures by institute are shown in Table 1. The College leveraged these funds with support from Sea Grant Hawai'i to offer the Teaching Science as Inquiry: Aquatic Science institutes. Further, CRDG science faculty designed and conducted the science institutes, therefore, personnel costs were not charged against the appropriated STEM funds. The Act 111 funds provided intensive professional development in mathematics for 12 elementary and 24 secondary mathematics teachers; and 175 elementary and 60 secondary teachers in science content and inquiry teaching. These teachers will impact an estimated 3,800 elementary students and 7,800 secondary students in the 2008–2009 academic year.

**Table 1. Professional Development FY 08 Act 111 Funds (\$175,000)**

<b>MATHEMATICS</b>	<b>Number of Teachers</b>	<b>Personnel</b>	<b>Stipends</b>	<b>Materials</b>	<b>Supplies</b>	<b>Travel</b>	<b>Total</b>
Understanding Elementary Mathematics and Pedagogy	12	\$5,000	\$5,500	\$889	\$2,676	\$536	\$14,601
Increasing Teacher Content Knowledge in Mathematics	24	\$8,000	\$3,300	\$600	\$600	\$12,216	\$24,716
<b>Math Subtotal</b>	36						<b>\$39,317</b>
<b>SCIENCE</b>							
Meeting Hawai'i Content and Performance Standards Grade 3	24		\$6,000	\$2,450	\$250		\$8,700
Meeting Hawai'i Content and Performance Standards Grade 4	24		\$6,000	\$2,450	\$250		\$8,700
Meeting Hawai'i Content and Performance Standards Grade 5	24		\$6,000	\$2,450	\$250		\$8,700
Meeting Hawai'i Content and Performance Standards Grade 6	24		\$6,000	\$2,450	\$250		\$8,700
Developing Science, Health & Technology PreK/K	20		\$6,000	\$7,300	\$200		\$13,500
Developing Science, Health & Technology Grade 1	20	\$1,100	\$6,000	\$7,050	\$150		\$14,300
Developing	20	\$1,100	\$6,000	\$7,050	\$150		\$14,300

Science, Health & Technology Grade 2							
Developing Science, Health & Technology Grade 3	20	\$1,100	\$6,000	\$7,050	\$150		\$14,300
Teaching Science as Inquiry: Aquatic Science OAHU	24		\$3,600	\$900			\$4,500
Teaching Science as Inquiry: Aquatic Science MAUI	24			\$1,178		\$1,325	\$2,503

**Table 1. Professional Development FY 08 Act 111 Funds (\$175,000) continued**

<b>SCIENCE</b>	<b>Number of Teachers</b>	<b>Personnel</b>	<b>Stipends</b>	<b>Materials</b>	<b>Supplies</b>	<b>Travel</b>	<b>Total</b>
Teaching Science as Inquiry: Matter, Energy, and the Environment for Middle Schools	12		\$3,600	\$900	\$150		\$4,650
<b>Science Subtotal</b>	236						<b>\$102,853</b>
Evaluation Contract (Pacific Resources for Education & Learning)							\$24,500
Total Direct Costs							\$166,670
Administrative Costs @5%							\$8,329
<b>Total</b>	<b>272</b>						<b>\$175,000</b>

Due to the late release of funds the STEM professional development institutes were primarily held in June 2008. Therefore evaluation of the impact of the institutes on the effectiveness of teachers implementing the content and pedagogy learned is ongoing. Pacific Resources for Education and Learning (PREL) was contracted to design appropriate evaluation instruments and to conduct an external evaluation of the initiatives. Data collection is ongoing and results are not yet available. PREL is expected to produce an evaluation report in January 2009.

CRDG faculty continue to work with participants in the STEM professional development institutes through regular communications, email, and weekly sessions using the Hawai'i Interactive Television System (HITS). In 2008 HITS sessions are conducted weekly and focus on supporting teachers using the *Meeting Science Standards* (MSS), *Foundational Approaches in Science Teaching* (FAST), and *Aquatic Science* programs developed by CRDG science faculty.

**The Implementation of the STEM Professional Development Programs**

**2008–2009 Fiscal Year Proposed Activities**

As noted above, the Legislature appropriated \$175,000 for STEM professional development in Act 111 for both years of the biennium. However, as of the end of October 2008, no funds have been released. A request was sent to the Governor to release funds for the FY 09. The College was subsequently asked to provide further information in response to specific questions. The questions and responses are included below.

Regarding the release of Act 111 funds for FY 09 (\$175,000 for STEM Professional Development), we provide our responses to your questions below.

1. Is there an estimated breakdown of how the \$175,000 will be used for FY 09?
  - Yes. See attached.
  - The actual costs exceed those in the budget and are being contributed by the various faculty and/or units involved. Only actual additional costs associated with providing the professional development are requested.
  
2. Are there any other sources of funding for the professional development program aside from Act 111 funds?
  - No other sources are currently available for the items in the attached budget breakdown.
  
3. What classes/training are planned to be offered this year? How many teachers are expected to attend?
  - Mathematics and Science professional development institutes that are research-based and fully field-tested for effectiveness in changing teacher behaviors in ways that result in higher student achievement and engagement.
  - 324 K–12 teachers to participate statewide.
  - See attached.
  
4. Are there plans to continue this program beyond FY 09? If so, how will it be funded?
  - Yes. Several funding proposals have been submitted for federal support. Others are planned for submission in spring 2009.

Table 2 shows the proposed use of the funds should they be released.

**Table 2. Professional Development Proposed for FY 09 Act 111 Funds (\$175,000)**

	<b>Number of Teachers</b>	<b>Personnel</b>	<b>Stipends</b>	<b>Materials</b>	<b>Supplies</b>	<b>Travel</b>	<b>Total</b>
<b>MATHEMATICS</b>							

Understanding Elementary Mathematics and Pedagogy (Grades K–6)	20	\$12,000	\$9,900	\$4,600	\$2,600	\$9,650	\$38,750
Masters of Education in Teaching Mentoring Collaboration (Grades K–12)	24	\$8,400					\$8,400
Professional Development to Extend Formative Assessments (Grades 6–9)	16	\$3,000	\$12,750	\$1,000			\$16,750
Mathematics Content Collaboration (Grades 9–12)	20		\$22,400	\$2,000		\$8,100	\$32,500
Math Subtotal							\$96,400

**Table 2. Professional Development Proposed for FY 09 Act 111 Funds (\$175,000) continued**

<b>SCIENCE</b>	<b>Number of Teachers</b>	<b>Personnel</b>	<b>Stipends</b>	<b>Materials</b>	<b>Supplies</b>	<b>Travel</b>	<b>Total</b>
Meeting Science Standards Grade 3	24	\$1,024		\$3,600	\$300		\$4,924
Meeting Science Standards Grade 4	24	\$1,024		\$3,600	\$300		\$4,924
Meeting Science Standards Grade 5	24	\$1,024		\$3,600	\$300		\$4,924
Meeting Science Standards Grade 6	15			\$2,250	\$300		\$2,550
Developing Science, Health & Technology in PreK-K	20	\$1,535		\$7,000	\$200		\$8,735
Developing Science, Health & Technology in Grade 1	20	\$1,535		\$7,000	\$200		\$8,735
Developing Science, Health & Technology in Grade 2	20	\$1,535		\$7,000	\$200		\$8,735
Foundational Approaches in Science Teaching Grades 6-8	15			\$5,250	\$200		\$5,450
Teaching Science as Inquiry: Aquatic Science on Oahu	20	\$614		\$1,000	\$200		\$1,814
Teaching Science as Inquiry: Aquatic Science on Kauai	15				\$50	\$700	\$750
Teaching Science as Inquiry: Aquatic Science on Hawai'i	15				\$50	\$700	\$750
Teaching Science as Inquiry:	20	\$614		\$1,000	\$200	\$1,400	\$3,214

Aquatic Science on Maui							
Teaching High School Physics, Physiology & Technology	12	\$12,067		\$6,250	\$2,500		\$20,817
Subtotal Science							\$76,322
Indirect Costs							\$ 2,279
<b>Total</b>	<b>324</b>						<b>\$175,000</b>

### **The Status of the Transition to Teaching Program**

The Transition to Teaching program (TTT) at the University of Hawaii at Manoa (UHM) includes the following two partners: UHM College of Education (COE) and the State of Hawai`i Department of Education (HIDOE). The goal of this project is to recruit and retain highly qualified science and mathematics teachers at the secondary level who will serve Hawai`i's high need-schools. The target populations consist of mid-career professionals and recent college graduates outside of education.

As with the STEM professional development appropriation, funds for TTT were not released until March 2008, reducing the College's ability to recruit and retain STEM students. Requests for release of the FY09 funds have been submitted. However, the \$175,000 appropriated by the Legislature for FY09 have not yet been released. This section reports TTT's outcomes for the fiscal year of 2008 (FY08).

Two main objectives guide TTT: (1) develop, implement, and institutionalize a systemic and comprehensive recruitment, training, and support program that will produce new teacher candidates in secondary science and mathematics and will serve as a model for other teacher shortage areas; (2) implement and institutionalize a post-baccalaureate alternative licensure route program which leads to proper certification and teaching credentials for individuals who have science or mathematics degrees.

### **Recruitment**

The State-funded TTT program is designed for those individuals who have graduated from college with a degree outside of education and wish to pursue a teaching career in science or mathematics. Interested applicants are encouraged to apply to the Post-Baccalaureate Certificate in Secondary Education (PBCSE) in the College of Education. The PBCSE is a teacher preparation program that leads to eligibility for an initial teaching license. The PBCSE offers a cohesive, field-based experience that encourages students to integrate educational theory and practice in cooperating secondary schools. PBCSE candidates are admitted to the campus program in the Fall and Spring semesters. Candidates for a Statewide hybrid PBCSE, which combines face-to-face and online courses, are admitted once a year. The PBCSE Program

consists of interrelated courses totaling 33 credits hours for science or mathematics majors. The TTT grant awards financial and instructional assistance to successful PBCSE candidates in science or mathematics.

The State-funded TTT program recruitment activities include, but are not limited to, press releases (such as newspaper articles and flyers), informational sessions and mailers targeted to science and mathematics undergraduate majors, development and maintenance of a comprehensive website, and other recruitment efforts. These strategies resulted in over 100 inquiries. In year 1 of the state-funded TTT program, the Office of Student Academic Services identified 18 qualified applicants in science or mathematics that met the admissions criteria for entry into the PBCSE program. These admissions criteria include: a minimum cumulative GPA of 2.50 and a major cumulative GPA of at least 2.50, a minimal composite score of 516 in the reading, writing, and mathematics subtests of the Pre-Professional Skills Test (PPST) or Computerized Pre-Professional Skills Tests (C-PPST) of the PRAXIS series with a minimum score of 170 in each subtest, the passing of an appropriate PRAXIS Subject Assessment Content Knowledge Test, a minimum of 40 hours of current (within the past 5 years) group leadership involvement with secondary-aged youth. Such “field experience(s)” may be completed on either a paid or voluntary basis, and the successful completion of a Personal Admissions Interview. Of those 18 qualified applicants, 15 were accepted into the TTT program. Of these students, 11 are majoring in science education and 4 in mathematics education.

### **Program Implementation**

The TTT program has implemented a comprehensive support system that consists of the following: tuition stipends throughout the PBCSE program, PRAXIS support, and professional development workshops. Tuition stipends are \$1,000 per semester for 3 semesters during enrollment in the teacher preparation program. In return, participants are obligated to teach in the HDOE upon completion of the program. Passing the PRAXIS examinations is a requirement for licensure by the Hawai‘i Teacher Standards Board. The TTT program offered participants reimbursement for all PRAXIS exams for which participants had a passing score. Professional development workshops are offered each semester on topics students identify as in need of additional attention, for example, classroom management and motivational strategies. These workshops are offered three times a year and are open to all current TTT participants and graduates of the PBCSE program.

### **Support/Retention**

A positive support/retention strategy used by the Hawai‘i State-funded TTT program was to hire experienced mentor teachers. Mentor teachers act to reduce attrition after employment. The duties of a mentor teacher are to observe pre-service teachers and new graduates, model effective pedagogical techniques, and give accurate feedback to the graduate and program director. Each graduate is assisted between two to nine times per semester. The number of observations is determined by the needs of each graduate. Most frequently mentioned areas that new teachers need help are classroom management, engaging students to focus on their work, learning different instructional strategies for use in teaching their content field, and dealing with a heavy

workload. In every visit, the mentor teacher documents the need areas and indicates what they did to help the participants.

The State-funded TTT program has made significant contributions to the teaching profession throughout Hawai‘i. For the past few decades, there has been a shortage of qualified and licensed mathematics and science teachers in the HIDOE, especially in rural areas, such as in the islands of Maui, Moloka‘i, Hawai‘i and Kaua‘i. In response to this need, the TTT program has offered a viable solution to alleviate these challenges by implementing a comprehensive support program that consists of tuition stipends throughout the PBCSE program, PRAXIS support, availability of a program through hybrid delivery models (meaning the program is available statewide), professional development workshops, and experienced mentoring support. Table 3 shows the expected expenditures for this year should funds for FY 09 be released.

**Table 3. Expenditure Plan Transition to Teaching Program FY 09 Act 111 Funds**

<b>Budget Item</b>	<b>Planned Expenditure</b>
Personnel Project manager \$48,000 Three mentor teachers \$30,000 Student assistant \$6,000	\$84,000
Travel Neighbor islands and Oahu mileage	\$5,780
Student Stipends	\$79,220
Supplies	\$4,000
Workshops for TTT students and graduates	\$2,000
<b>Total</b>	<b>\$175,000</b>

### **COLLEGE OF EDUCATION CURRENT STEM INITIATIVES**

The College of Education continues to be active in supporting STEM initiatives in the State. In addition to preparing STEM teachers for licensure, faculty are engaged in a variety of research and professional development efforts to increase understanding of STEM issues, support in-service teachers in improving their content knowledge and ability to teach and assess effectively in science, technology, engineering, and mathematics. Current efforts within the College of Education are described below.

## CRDG MATHEMATICS PROFESSIONAL DEVELOPMENT

### **Blanche Pope Elementary Mathematics Development**

Professional development and coaching in elementary mathematics based on the Measure Up project research on mathematics learning being conducted at CRDG University Laboratory School.

- 30 hours professional development; 18 hours in summer 2007; 12 hours as follow-up during the academic year; 3-4 hour each session
- Ongoing in-class support
- Participants: 10 teachers and school principal over two years
- Funding: Harold K.L. Castle Foundation
- Contact Person: Dr. Hannah Slovin 956-9956 hslovin@hawaii.edu

### **Nanakuli, Pearl City, Waipahu Complex Secondary Mathematics Development**

Professional development in mathematics based on *Algebra I: A Process Approach* and *X-Power Interactive* developed by CRDG at University Laboratory School.

- Four days professional development in instructional strategies that enhance mathematics communication
- Technology integration using *X Power Interactive* software
- Participants: 15 secondary Algebra I teachers
- Funding: Hawai'i DOE
- Contact Person: Dr. Hannah Slovin 956-9956 hslovin@hawaii.edu

### **Honolulu District Mathematics Development Grades K–12**

Professional development in mathematics based on *Algebra I: A Process Approach*, *X-Power Interactive*, *Reshaping Mathematics for Understanding*, and *Measure Up* developed by CRDG at University Laboratory School.

- Five days professional development for each group over the year
- Algebra used to establish connections among four mathematics strands aligned with Hawai'i Content and Performance Standards III
- Participants: 75 elementary teachers, school administrators, resource teachers, and school renewal specialists; 35 secondary teachers, school administrators, resource teachers, and school renewal specialists
- Funding: Hawai'i DOE
- Contact Person: Dr. Hannah Slovin 956-9956 hslovin@hawaii.edu

### **Lanakila Elementary School Mathematics Science Partnership**

Focus on mathematics instruction and teaching strategies; focus on Japanese lesson study approach

- Four two-hour sessions fall 2007; additional sessions spring 2008
- All teachers K–5
- Funding: Hawai‘i DOE
- Contact Person: Dr. Melfried Olson 956-3939 melfried@hawaii.edu

### **Stevenson Middle School Mathematics Development**

Professional development focused on instructional strategies that enhance mathematical content knowledge, help students think algebraically, and become better problem solvers; strategies to help struggling students.

- Two-day sessions; classroom visits to University Laboratory School
- Using formative assessment in teaching and learning mathematics
- Attending to language and other forms of communication in mathematics
- Effects of classroom organization for instruction
- Using worthwhile mathematics tasks that are challenging and accessible for all students; follow-up full- and half-day classes
- Participants: 10
- Funding: Hawai‘i DOE
- Contact Person: Dr. Hannah Slovin 956-9956 [hslovin@hawaii.edu](mailto:hslovin@hawaii.edu)

## **CRDG MATHEMATICS RESEARCH AND DEVELOPMENT**

### **Measure Up Research Elementary**

Research in grades 1–5 focused on how students learn mathematics, especially algebraic concepts; based on work done by Russian mathematicians; curriculum development and testing in University Laboratory School and Connections Public Charter School.

- Ongoing R&D on learning algebraic concepts
- Basis for professional development with other Hawai‘i and Mississippi schools
- Participants: University Laboratory School and Connections School
- Funding: CRDG, Harold K.L. Castle Foundation, John and Sue Dean Foundation
- Contact Person: Dr. Hannah Slovin 956-9956 [hslovin@hawaii.edu](mailto:hslovin@hawaii.edu)

### **The Effects of Formative Assessment in a Networked Classroom on Student Learning of Algebraic Concepts Grade 7**

Research on formative assessment and instructional technology on achieving 7<sup>th</sup> grade algebra concepts.

- Effective uses of formative assessments
- Effective use of networked classrooms using state of the art technology
- Partners: Hawai‘i DOE and Texas Instruments Company
- Funding: National Science Foundation, Texas Instruments Company, CRDG
- Contact Person: Dr. Hannah Slovin 956-9956 hslovin@hawaii.edu

### **Using Technology to Improve Mathematics Learning Grade 12**

Research on applications of Texas Instruments’ TI-NSpire classroom technology to improve learning of 12<sup>th</sup> grade pre-calculus concepts.

- Using technology in the classroom for professional development
- Funding: Texas Instruments Company
- Contact Person: Dr. Hannah Slovin 956-9956 hslovin@hawaii.edu

### **The Role of Gender in Language Used by Children and Parents Working on Mathematical Tasks**

Research on gender-related differences in language and actions used by children and parents when working on mathematical tasks in number, algebra, and geometry, and determine relationships among (a) parents’ competence beliefs for their children’s success in mathematics, (b) children’s self-efficacy and interest in mathematics, and (c) cognitively demanding language used by parents and children working together.

- Administrators and teachers from six elementary public schools statewide assisted with recruiting parents and their children in third and fourth grade classrooms
- Engaging mathematics tasks on number and operations, algebra, and geometry
- Videotaping sessions with over 110 child/parent dyads
- Research to be highlighted on Best of Our Knowledge on National Public Radio through collaboration with WAMC in Albany, New York and Hawai‘i Public Radio
- Funding: National Science Foundation
- Contact Person: Dr. Judith Olson 956-3939 jkolson@hawaii.edu

## **CRDG SCIENCE PROFESSIONAL DEVELOPMENT**

### **Teaching Science as Inquiry (TSI) Grades K–12**

*Teaching Science as Inquiry* provides science professional development in teaching science content through using inquiry as the primary teaching strategy. Students engaged in actively doing laboratory and field work learn content more readily and retain it longer than in textbook/lecture approaches. Instructional materials are drawn from CRDG’s award winning programs.

- 24 hours of instruction; Ongoing follow up support
- TSI professional development institute are available in the following content areas and grade levels
  - Aquatic Science grades 7–12
  - Middle School Physical Science grades 6–9
  - Elementary Mechanics grades K–6
  - Elementary Astronomy grades K–9
- Instructional materials development
- Funding: Fee for services, CRDG, Hawai‘i State Legislature
- Contact Person: Dr. Francis M. Pottenger 956-6918 frankp@hawaii.edu

### **Science Professional Development Through Distance Learning: Hawai‘i Interactive Television System (HITS)**

The Hawai‘i Interactive Television System has been used by the science section of CRDG since 1988 to do post-training professional development. Each year’s programming is newly created to meet teacher needs and support CRDG research. In 2008 focus is on supporting teachers using the *Meeting Science Standards* (MSS), *Foundational Approaches in Science Teaching* (FAST), and *Fluid Earth/Living Ocean* (FE/LO) programs developed by CRDG science faculty.

- 60 hours of professional development over two semesters
- Participants: 30 teachers statewide
- Funding: CRDG
- Contact Person: Dr. Francis M. Pottenger 956-6918 frankp@hawaii.edu

### **Meeting Science Standards (MSS) Grades 4–7**

*Meeting Science Standards* is a new development sequence drawn from CRDG’s award winning programs *Foundational Approaches in Science Teaching* (FAST) and *Developmental Approaches in Science, Health and Technology* (DASH) designed to assist teachers in meeting the Hawai‘i Content and Performance Standards III for science in grades 4–7. The series reorganizes and sequences inquiry investigations with additional newly developed activities.

- 30 hours of professional development
- Instructional materials development
- Participants: 14 teachers statewide
- Funding: Fee for services; CRDG
- Contact Person: Dr. Carol Ann Brennan 956-6918 carolb@hawaii.edu

### **Life Science Investigations (LSI) Grade 7**

The project brings together formal and informal science venues and educators to increase science proficiency at the 7<sup>th</sup> grade level. Partners include CRDG, the Hawai‘i DOE Ka‘u, Kea‘au and Pahoa Complex Area, a charter school, a private school the University of Hawai‘i at Hilo’s

Biology and Education programs, Friends of the Panaewa Zoo, and Science FUNDamentals, a private business. All middle-school teachers receive training in 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade based on CRDG's award winning *FAST* program. Additional instructional materials will be developed to investigate life scenes at the Panaewa Rainforest Zoo and Gardens.

- 36 hours professional development
- Instructional materials development
- Technology integration
- Distance Learning Education applications
- Participants: 30 including UH Hilo preservice teachers and Big Island inservice teachers
- Funding: NCLB Higher Education grant; CRDG
- Contact Person: Dr. Donald B. Young 956-7961 young@hawaii.edu

### **Graduate Fellows in K-12 Education (GK12)**

In 1999, The Ecology Evolution & Conservation Biology program at UH was awarded a Graduate Fellowships in K-12 Education (GK12) training grant from the National Science Foundation. The program provides selected high-ability graduate students fellowships in exchange for working in K–12 schools to improve science education. CRDG faculty provide the education component that prepares fellows to work successfully with K–12 students and teachers in teaching science as inquiry. University Laboratory School provides the training site. To date some 20 plus fellows have participated in the program.

- 60 hours professional development for fellows
- Fellows provide various amounts of professional development for inservice teachers depending on individual projects
- Participants: 6 fellows in 2007 working with 5 schools (Castle High School, Hokulani Elementary School, ASSETS School, Seabury Hall Academy), Hui Malama Learning Center, and Lyon Arboretum Education Program
- Funding: National Science Foundation
- Contact Person: Dr. Erin Baumgartner 956-4439 erinbaum@hawaii.edu

### **Ka Waihona o Ka Na‘auao Public Charter School (K–5) Science**

Professional development provided for all K–5 teachers to enable school-wide implementation of *Developmental Approaches in Science, Health and Technology* (DASH) program. Begun in summer 2006 and continuing; expected completion in summer 2008. Additional goal is to develop a cadre of DASH trainers in Leeward Oahu.

- 60 hours professional development with ongoing follow-up support
- Participants: 14 elementary teachers and specialists
- Funding: Ka Waihona PCS
- Contact Person: Dr. Francis M. Pottenger 956-6918 frankp@hawaii.edu

## **School Web of Instructional Media (SWIM)**

SWIM ([www.hawaii.edu/swim/](http://www.hawaii.edu/swim/)) makes connections between CRDG science programs, thousands of extant video, still pictures, and World Wide Web pictures, and hundreds of registered instructors and their classrooms. The SWIM database enables teachers and students to enrich and enhance their learning experience with its quick textbook-media connections, each linked to a specific concept.

- Services directly to middle and high school science students and instructors
- Science content knowledge and applications
- Participants: Middle and high school students and instructors
- Funding: CRDG
- Contact Person: Dr. Thomas Speitel 956-6855 [speitel@hawaii.edu](mailto:speitel@hawaii.edu)

## **Hawai'i Watersheds Database**

The Hawai'i Watershed Database ([www.hawaii.edu/environment/](http://www.hawaii.edu/environment/)) was created as part of a Hawai'i Department of Health project to provide a central place for students, teachers, and professional researchers to develop and test hypotheses to understand the impact of human behavior and natural events on the watershed ecology. The project's geographical scope includes watershed areas of all major Hawaiian Islands. The data topics include location, time, weather, land use, ocean characteristics, chemistry, substrates, plants, animals, and investigatory influence. Over 1500 entries from school groups and the community can be found on the site.

- Services directly to elementary, middle and high school science students and instructors
- Science content knowledge and application
- Participants: Middle and high school students, their instructors, and the community
- Funding: CRDG
- Contact Person: Dr. Thomas Speitel 956-6855 [speitel@hawaii.edu](mailto:speitel@hawaii.edu)

## **CRDG SCIENCE RESEARCH AND DEVELOPMENT**

### **Physics, Physiology, and Technology (PP&T) Grades 9–10**

PP&T is a course in development for grade 9 or 10 in physical science that integrates applications in physiology. It is a collaboration of the UH Manoa Physics Department and the College of Education's CRDG. Investigations and teacher supports have been developed and tested at University Laboratory School and with 12 pilot teachers statewide.

- 30 hours of professional development
- Instructional materials development
- Participants: 23 teachers statewide
- Funding: NCLB Higher Education grant; CRDG

- Contact Person: Dr. Francis M. Pottenger 956-6918 frankp@hawaii.edu

### **Invention Factory: Applied IT Project for Hawai'i's Youth**

CRDG is conducting a three-year program funded by the National Science Foundation that teaches technology to teenagers through interactive hands-on projects that improve human computer interaction for elderly and disabled individuals. The goal is to stimulate interest in science and engineering careers among students currently underrepresented in those fields; women, Native Hawaiian, and students with disabilities. The work will create a blueprint for using accessibility and human factors as a tool to promote STEM subjects to teenagers. The broader impact is to demonstrate that students who create technology-based solutions that impact people will have substantially increased motivation to pursue careers in engineering.

- Services directly to middle and high school students in after school program
- Technology content knowledge and application
- Service learning component
- Participants: Middle and high school students on Oahu
- Funding: National Science Foundation
- Contact Person: Dr. Thomas Speitel 956-6855 speitel@hawaii.edu

### **Other Ongoing CRDG STEM R&D Projects**

CRDG is continuing development and dissemination of its K–12 science and mathematics programs. Several programs are recognized nationally and internationally as exemplary and among the most effective in increasing teacher content knowledge and teaching skills and improving student achievement in STEM content areas. In 2006–2007, in addition to Hawai'i, CRDG is working with schools in California, Georgia, Illinois, Kansas, Mississippi, China, Ethiopia, Guam, Republic of the Marshall Islands, and Russia. Faculty are engaged with ongoing development and dissemination of the following CRDG-developed STEM programs.

- *Measure Up Mathematics* Grades 1–5
- *Reshaping Mathematics for Understanding* Grades 6–8
- *Algebra I: A Process Approach* Grades 8–9
- *X Power Interactive* Grades 8–10
- *Developmental Approaches in Science, Health and Technology (DASH)* Grades K–6
- *Foundational Approaches in Science Teaching (FAST)* Grades 6–9
- *Fluid Earth and Living Ocean (FELO)* Grades 9–12
- *Physics, Physiology, and Technology (PP&T)* Grades 9–10
- *Meeting Science Standards (MSS)* Grades 3–7
- *Teaching Science as Inquiry (TSI)* Grades K–12

**COLLEGE OF EDUCATION CENTER ON DISABILITY STUDIES**

### **Ka Hana ‘Imi Na’auao: A Science Curriculum Project**

Developing a science curriculum that infuses Hawaiian principles/values with “traditional” science methodology. Emphasis is placed on career options for students. The curriculum addresses State of Hawai‘i Content and Performance Standards III for Science.

- Instructional materials development
- Professional development provided for teachers statewide
- Target 700 students
- Funding: U.S. Department of Education Native Hawaiian Education Grant
- Contact Person: Dr. Robert Stodden 956-9199 [stodden@hawaii.edu](mailto:stodden@hawaii.edu)

### **Ha‘awina Ho‘opapau Project: Science in Hawai‘i**

- Developing a culturally responsive secondary science curriculum that teaches through (rather than just about) Native Hawaiian culture. The curriculum incorporates Native Hawaiian cultural values while also providing the knowledge and skills students need to meet the Hawai‘i Instructional materials development
- Professional development provided for teachers statewide
- Target 700 students
- Funding: U.S. Department of Education Native Hawaiian Education Grant
- Contact Person: Dr. Robert Stodden 956-9199 [stodden@hawaii.edu](mailto:stodden@hawaii.edu)

## **COLLEGE OF EDUCATION ACADEMIC DEPARTMENTS**

### **Transition to Teaching**

Transition to Teaching is a U.S. Department of Education grant to the College of Education to recruit and train STEM teachers who hold undergraduate degrees in STEM related fields. The program provides of tuition support for candidates enrolled in the College’s Post Baccalaureate Certificate in Secondary Education program, which prepares them to meet Hawai‘i State Licensure requirements. Over 4 years the program has prepared over 100 new teachers for Hawai‘i’s schools. The grant ends in 2008. The 2007 Hawai‘i State Legislature appropriated \$250,000 in each year of the 2007–2009 biennium to continue the recruitment and training effort.

- Provides tuition support for those with undergraduate degrees in STEM related fields to complete the Post Baccalaureate Certificate in Secondary Education as preparation for obtaining a teaching license.
- Two semesters and two summers to complete the program
- Over 100 STEM teachers recruited and trained.
- Grant support through 2008
- Hawai‘i State Legislative appropriation through 2009
- Participants: Currently

- Contact Person: Brandon Chun 956-6093 [btchun@hawaii.edu](mailto:btchun@hawaii.edu)

### **Materials and Methods in Science: Teaching the Physical Sciences (EDCS 450)**

Course designed for teachers of physical science to support out-of-field teachers and teachers who wish to review or update their physical science background. Provide hands-on, inquiry-based course to deepen conceptual understanding of Hawai‘i Content and Performance Standards III for Science.

- Participants develop and peer teach focused lesson addressing a benchmark.
- Teacher research projects.
- Participants: 15
- Funding Source: NCLB Higher Education, Curriculum Studies Department
- Contact Person: Dr. Barbara Klemm 956-6823 [klemm@hawaii.edu](mailto:klemm@hawaii.edu)

### **LEI Aloha’s Connections to Teaching Careers: A Teacher Quality Enhancement Recruitment & Retention Project**

The focus of the project is to produce more secondary teachers who are able to meet the challenges of Hawai‘i’s diverse, under-resourced classrooms by creating an educational continuum to recruit, prepare, and retain teachers in high-need subject areas and schools. The priority is to get more teachers in math and science with emphasis on neighbor island and mainland recruits. Teacher preparation activities focus on developing high-quality, online curricula for secondary education math and science programs. This initiative will increase the capacity of the University of Hawai‘i to recruit out-of-state candidates as well as to meet the needs of island residents in remote areas through online cohort-based programs.

- 37 credits online post-baccalaureate degree in secondary education
- 50 candidates to receive scholarship funding; first cohort starts August 2008
- Collaboration with Hawai‘i Association for Future Teachers and Teacher Cadet Academy
- Partnership with Farrington High School for math and science tutoring, UH Math department, and Leeward Community College
- Partnership with Oceanic Time-Warner Cable for video public service announcements
- Funding: U.S. Department of Education
- Contact Person: Dr. Curtis P. Ho 956-7771 [curtis@hawaii.edu](mailto:curtis@hawaii.edu)

### **JVEF Military Math Consortium**

Professional development in elementary mathematics including the development and implementation of standards-based lessons with classroom teachers.

- Four days per school per quarter (16 days per year per school)
- Participants: Faculty and administration from Lehua Elementary School, Kainalu Elementary School, and Waikele Elementary School.

- Funding: Joint Venture Educational Forum
- Contact Person: Dr. Neil Pateman 956-3995 pateman@hawaii.edu

### **Kauai Math/Science MED in Curriculum Studies**

A hybrid on-site and online graduate program offered at the special request of the Kauai DOE.

- Two graduate level courses offered each quarter. Anticipated graduation Spring 2008.
- Participants: Middle and secondary math and science teachers
- Funding: Kauai DOE
- Contact Person: Dr. Neil Pateman 956-3995 pateman@hawaii.edu

### **Nanaikapono Comprehensive Curriculum Partnership**

Professional development support in understanding and responding to quarterly mathematics assessments, implementation of standards-based mathematics lessons, and building professional development capacity within school faculty.

- Multiple activities over four years
  - Seven days per quarter of work with grade-level teachers
  - Three 2-week summer institutes .
- Participants: All grade K–6 and special education teachers from Nanaikapono Elementary School
- Funding: U.S. Department of Education Native Hawaiian Education Grant
- Contact Person: Dr. Joseph Zilliox 956-5358 zilliox@hawaii.edu

### **Maunaloa Mathematics Initiative**

Professional development in the content and methods of K–6 mathematics.

- Six days over one year ending May 2008; two full-day sessions in Summer 2007; one day per quarters of model lessons
- Teacher implemented lessons between PD sessions
- Participants: All grade k-6 teachers from Maunaloa Elementary School, Molokai.
- Funding: Hawai‘i DOE School-based funds
- Contact Person: Dr. Joseph Zilliox 956-5358 zilliox@hawaii.edu