Leveraging the University’s research capabilities to advance Science – Technology - Engineering - Math (STEM) Education

A teacher-driven model
Background

**STEM Pre-Academy Program: 2007 - Present**

- June 2007 – Legislative Initiative: State of Hawaii 24th Legislature passed ACT 111 to establish the FIRST* Pre-Academy (College of Engineering, UHM)

- December 2009 – 2011 ARRA-SFSF* Part B to University of Hawaii (UH) for Pre-Academy expansion, 2 year grant– ended June 30, 2011. (VPR)

- FY 2012 & FY 2013 – STEM Bridge

- FY 2014 – HB200 passed by Legislature: FIRST Pre-Academy (VPRI)

*FIRST – Fostering Inspiration and Relevance through Science and Technology
ARRA – American Recovery and Reinvestment Act
SFSF – State Fiscal Stabilization Fund
ACT 111 § 304A-A: Fostering Inspiration and Relevance through Science and Technology – Pre-Academy

- A voluntary teacher participation model
- Provide additional resources and expertise to DOE middle school teachers to stimulate the interest and achievement of middle school students in STEM skills
Approach

- **Capitalize** on the “creators of leading edge technology from one of the nation’s top public research universities”

- **Leverage** exciting and mutually beneficial partnerships and funding opportunities

- **Rapid dissemination** & implementation of teacher resources and opportunities directly into the classroom

- Create a dynamic **teacher-driven** approach – with “spiraling” outcomes

- Enable teachers to work together and learn from each other through a **community of practice**

**Flexibility, resources**, collaborative community created by workshops, portal, and **teacher liaison** were highlighted as keys to success by teachers.
Over 300 Participating Middle Teachers from 63 Public and Charter Middle Schools
Teacher-driven Model:
A Catalyst for Teacher Initiatives (as expressed by a teacher)

- Teachers identify & address gaps in existing curriculum
- Need to address benchmarks & common core curriculum
- Respond to specific needs of student learners
- Respond to boredom & lack of motivation of students
- Need for creative ideas & innovations
- Address current problems and/or timely topics in school & community
- Need for collegial & professional communication & dialogue
- Motivation for change
Sample of projects & activities

**Water – The Grand Challenge**

*Asia Pacific Information Exchange (APIX) technology – (US PACOM – ONR – FICHTR developed technology)*

UHM Water Resources Research Center (WRRC) & College of Engineering

- Pilot APIX Water Purification backpack system - Using real world applications of water research such as water purification systems for HA/DR can help invigorate student interest in STEM fields from the civil & environmental engineering perspective
- Pilot initiated in 2011 by former Interim Director of WRRC and Civil Engineering Professor, Dr. Chittaranjan Ray and Project Program Manager, Aashah Babbar

**Research-based Experience for Teachers**

Projects example -

WRRC: Water the Grand Challenge - Ilima

**Research-based Experience for Teachers**

Projects example-

FabLab ModelMaker in the classroom

**Research-based Experience for Teachers**

Collaborative Projects -

DNA/Genetics Workshop

- CTAHR* - Dr. Jon-Paul Bingham presented a lesson on Molecular Biology and DNA analysis.
- Participants were shown how to use Strawberry DNA extraction kits as well as ways to adapt this kit to the Hawaii Middle School classroom.
- Papaya DNA extraction was also introduced.
- Teachers from Kapolei, Pauilo, Kukakua, Jarrett, Highlands and Kalama schools were in attendance.

*CTAHR - College of Tropical Agriculture and Human Resources
More samples of projects, activities & tools

Research-based Experience for Teachers
Projects example—Engineering Design

- Engineering Design workshops in collaboration with UH College of Engineering.
- Teachers implement Engineering Design hands-on lessons in the classroom like catapult design, rocket design, video game controller design, and more.
- Support Chaminade University’s Office of Naval Research Education Program to assist teachers developing their Engineering Design curriculum.
- Mini-workshops include teacher’s sharing Engineering Design lessons implemented with their students.

Collaborative Projects
UH Geobiology Research Lab and PE/Health Teachers

- Researcher from Jahren Lab working with PE and Health teachers at Highlands Intermediate and Jarrett Middle schools.
- Speak to students about the research and science behind proper nutrition, focusing on the effects of processed sugar.
- Follow-up hands-on lesson for students to learn to make own low-cost, self-watering planters to grow vegetables at home or at school.
- Field trip for students to research lab to learn about nutrition and metabolism research being done through plants.

Tools:
STEM Intercommunity Portal (SIP)
A new “Leaf” – teacher driven transformation

- SIP allows teachers, researchers, industry and mentors in disparate locations to share ideas, collaborate and track activities on STEM.
- Based on user feedback from the teachers, SIP was redesigned in October 2013 with the user-friendly “SP Leaf”.
- A Leaf is similar to a Twitter tweet or a Facebook status. Users post “leaves” to share STEM information that users might find interesting to the larger community.
- A Leaf also acts as a communications tool between users, providing links to sites such as lesson plans, materials, photos, and program support.
“The vision is for **ALL** to shine... not only the stars”

Judy Inouye, retired teacher facilitator