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ESR - RURAL SYSTEMIC INITIATIVE PROG

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NSF PROPOSAL NUMBER

0100393

DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION
				1688198455	

EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)

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Hawaii Department of Education

AWARDEE ORGANIZATION CODE (IF KNOWN)

4044145000

ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE

Hawaii Department of Education
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NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE

University of Hawaii Manoa

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TITLE OF PROPOSED PROJECT **Hawaii Networked Learning Communities**

REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PREPROPOSAL NO., IF APPLICABLE
$ **6,000,000**	**60** months	**05/01/01**	

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Received :10/02/2000

Project Summary

The goal of the Hawai`i Networked Learning Communities (HNLC) is to prepare students in economically disadvantaged rural schools for life and careers in today's complex and dynamic technological world by enabling them to attain high standards in science, mathematics, engineering and technology (SMET). The Hawai`i Department of Education and the University of Hawai`i at Manoa spearhead a consortium of higher and lower education institutions, and businesses and community organizations in this project.

To achieve the above goal, HNLC focuses on attainment of the following objectives:

- Creating a high quality teaching and learning environment in SMET education for over 60 K-12 rural schools in Hawai`i.
- Supporting and strengthening state policies that impact the implementation of a standards-based approach to content learning and student achievement.
- Aligning and converging resources to build networked learning communities that support systemic reform efforts.
- Increasing commitment and support from various stakeholder groups to build and maintain SMET programs.
- Developing an assessment and accountability system that accurately and comprehensively measures students' achievement in SMET.
- Ensuring that our efforts enrich the education of all members of our diverse population, particularly native Hawaiians.

Strategies to accomplish these objectives include:

- Developing and implementing a multi-strand, professional development program that targets various groups: master teachers serving as teacher partners, building administrators, and school teams comprised of teachers, technology coordinators, and library media specialists. Major foci in the training will be alignment of curriculum with state-adopted content and performance standards; infusion of a rigorous inquiry approach to science and mathematics learning; application of technology in instruction; and use of alternative assessment strategies.
- Leveraging local resources under a theme of global environmental studies situated locally to achieve economic, ecological, and cultural relevance. Community-based student projects will benefit from Hawaii's world-class SMET resources, support management of natural resources and contribute to the development of a clean high-technology industry base.
- Supporting the framework and policies established for the Hawai`i Department of Education's Strategic Plan for Standards-Based Reform. HNLC will strengthen this statewide effort by assisting schools in developing their Standards Implementation Designs. HNLC will focus on short- and long-range activities and outcome measures in improving SMET learning and teaching.
- Designing and establishing a Virtual Community Center to access interactive web resource databases and networked collaboration technology to bridge geographic and institutional barriers. The Center will provide descriptions of and links to curricular resources in SMET, collegial assistance and mentoring for collaborative projects, and support for evaluation.
- Building community support for sustainable relationships in SMET improvement through establishment of a HNLC Coalition that represents a broad band of partner organizations and through staging of forums and workshops involving key stakeholder groups ranging from parents to legislators.
- Coordinating with a team of Hawai`i DOE and external evaluators to design and implement an accountability system that incorporates a broad range of assessment indices to accurately measure student achievement.

A key feature in the HNLC project is building capacity for sustained systemic reform. This feature is manifested in several ways: school teams mentoring new teams in the staff development program, Hawai`i DOE evaluators working with external evaluators on a long-range assessment plan, and Hawai`i DOE curriculum specialists collaborating with university faculty on the Virtual Community Center. The effective implementation of the project will serve as a prototype for capacity-building efforts in other reform initiatives. Hawaii's schools operate under a single statewide system under one superintendent, and serve some of the most ethnically diverse schools in the nation. HNLC will demonstrate strategies for successful implementation of standards-based SMET education on a large scale in the context of the emerging national and global multiculturalism.

Our Goals and Objectives

The Hawai`i State Department of Education and the University of Hawai`i at Manoa spearhead a consortium of higher and lower education institutions, and businesses and community organizations in an initiative known as **Hawai`i Networked Learning Communities** (HNLC, http://lilt.ics.hawaii.edu/hnlc/). The goal of HNLC is to prepare students in economically disadvantaged rural schools for life and careers in today's complex and dynamic technological world by enabling them to attain high standards in science, mathematics, engineering and technology (SMET). To achieve this goal, HNLC focuses on attainment of the following objectives:

- Creating a high quality teaching and learning environment in SMET for over 60 K-12 rural schools in Hawai`i.
- Supporting and strengthening state policies that impact the implementation of a standards-based approach to content learning and student achievement.
- Aligning and converging resources to build networked learning communities that support systemic reform efforts.
- Increasing commitment and support from various stakeholder groups to build and maintain SMET programs.
- Developing an assessment and accountability system that accurately and comprehensively measures student achievement in SMET.
- Ensuring that our efforts enrich the education of all members of our diverse population, particularly native Hawaiians.

The Hawai`i State Department of Education (DOE) has initiated an ambitious plan for achieving high standards for all students in science, math and technology through standards-based education. The Department's Strategic Plan for Standards-based Reform describes a comprehensive student support system that holds everyone accountable for student performance, drawing on not only teachers and classroom resources, but also on DOE expertise and the larger community to help students meet and exceed the standards. The Hawai`i Content and Performance Standards express the expectations we have of our students in diverse disciplines, including SMET. Schools are developing Standards Implementation Designs that facilitate accountability through school-level self-assessment, encouraging continuous improvement of curriculum and instruction as well as determining appropriate allocation of resources.

The implementation of systemic reform in the state of Hawai`i offers a unique opportunity for our nation in several respects. Our school system is a single statewide system under one superintendent, and thus presents an opportunity for successful implementation of standards-based education on a large scale. Our heterogeneous culture is a microcosm of the emerging global multiculturalism, presenting an opportunity to provide a model of the implementation of standards-based SMET education for a diverse population. Hawai'i also offers world-class science and technology resources for authentic problem-based learning.

Addressing the Drivers

NSF's Educational System Reform (ESR) division has identified six critical developments, known as "drivers", that are key to the success of systemic reform (http://www.ehr.nsf.gov/ehr/esr/driver.asp). We summarize our plans in terms of these drivers.

Driver 1: Implementation of a comprehensive, standards-based curriculum and/or instructional materials available to every student. The DOE has content standards in place and performance standards under development. HNLC will assist in the implementation of curriculum aligned with these standards by (a) fostering awareness of SMET resources by gathering standards-aligned descriptions of these resources in a shared resource database, (b) supporting partnerships between school staff and disciplinary specialists that result in the creation of integrated SMET curriculum and instruction drawing upon these resources, and (c) facilitating staff development and mentoring of implementation of this curriculum in the classroom.

Driver 2: Development of a coherent, consistent set of policies that supports provisions of broad-based reform of mathematics and science. The DOE's Strategic Plan constitutes such a set of policies. HNLC will support further refinement of these policies by providing awareness training to policy makers such as the Board of Education and state-level Education Cabinet, and will help ensure the implementation of these policies by supporting school-level planning processes.

Driver 3: Convergence of all resources that are designed for or that reasonably could be used to support science and mathematics education into a focused program that upgrades and continually improves the educational program in science and mathematics for all students. Our planning process has identified many of these resources and engaged them as coalition members. This work will continue as we establish a Virtual Community Center,

providing interactive web-accessible databases to make all SMET resources available to rural schools, and networked collaboration technology enabling collegial assistance, mentoring and collaborative projects across geographic and institutional barriers. We will ensure that contributions are in harmony with each other and with DOE's own efforts by providing coalition members with awareness training concerning the state content and performance standards and the now-mandatory school-level standards implementation planning process.

Driver 4: Broad-based support from parents, policymakers, institutions of higher education, business and industry, foundations, and other segments of the community for the goals and collective value of the program that is based on an understanding of the ideas behind the program and knowledge of its strengths and weaknesses. This support is reflected in the composition of our coalition, and will be built up further during the implementation period. Awareness training will be provided to disciplinary experts, the business community, members of the legislature, philanthropical and educational organizations, and the community at large.

Driver 5: Accumulation of broad and deep array of evidence that the program is enhancing student achievement through a set of indices. HNLC is working with the appropriate DOE offices to assist their efforts in piloting science assessment instruments and to ensure that achievement test scores are obtained annually in science and mathematics. HNLC will take a capacity-building approach to evaluation in which the contracted evaluator will provide staff training in evaluation methods and work with HNLC and DOE staff to track the influence of our interventions from their immediate effects to impact on student achievement. By engaging schools in the collection and use of data we will enrich the depth of evidence available and will facilitate continued use of empirical indices for planning purposes beyond the funded period.

Driver 6: Improvement in the achievement of all students, including those historically underserved … evidence that clearly demonstrates that, to a significant degree, changes in student achievement and performance can be attributable to the catalytic impact of the SI. Our native Hawaiian population is of special interest as historically underserved, yet all ethnic groups in our multicultural state will be served and tracked. Culturally relevant curriculum and community-based projects that situate SMET education in local concerns will help reach these populations. HNLC is working with DOE to ensure that we can disaggregate achievement data by ethnic populations.

Context and Needs

To set the stage for the implementation, we describe Hawaii's rural public schools, which are unique in terms of administrative organization, demographics, geography, and natural and cultural resources. We then describe one of the greatest strengths of our school system: its strategic plan for standards-based education. Finally, we summarize the comprehensive needs assessment study we conducted during the development period.

Hawaii's Public Schools

Statewide and Administrative Units

The Hawai`i State Department of Education (DOE) is unique as a single statewide system under one superintendent, and thus presents an opportunity for successful implementation of standards-based education on a large scale. The DOE replaces the system of school districts (LEAs) found in other states with complexes organized into districts. Eight administrative units, containing 253 schools, 187,395 students, and employing approximately 12,000 teachers, are distributed as follows: four districts serving the island of O`ahu: Honolulu (entirely urban), Central, Leeward, and Windward; the Hawai`i District, serving the "Big Island" of Hawai`i; the Maui District, serving the islands of Maui, Moloka`i, and Lana`i; and the Kaua`i District, serving the islands of Kaua`i and Ni`ihau.

Hawai`i boasts some of the most ethnically diverse public schools in the nation, but unfortunately many of these schools have high poverty levels as well. Seventy percent of the students state-wide represent diverse ethnic populations from East or Southeast Asian and Pacific Islander backgrounds, including Hawaiian/Part Hawaiian (25%), Filipino (19%), Japanese (12%), Korean (8%), Chinese (3%), and Samoan (3%), among others. In 107 schools containing 63,105 students, 50% or more of the students are on free or reduced lunch programs (indicative of high poverty levels). These 107 schools constitute about 43% of Hawaii's schools, or about 33% of the state's students.

Rural Schools

The 1990 U.S. Census classified 64 of Hawaii's schools as Rural (code 7) or Small Town (code 6). The rural/small town schools are located mostly in the Hawai`i and Maui districts (the Maui district also includes the islands of

Moloka`i and Lana`i), and in the Leeward unit of O`ahu. Kaua`i has fewer schools, but an appreciable percentage in the rural/small town categories. The distribution of these schools and other statistics are shown below.

Unit	*Total*	*Total*	*Rural Schools*		*Rural Enroll.*		*Free/C/R*	*Hawaiian*	*ESLL*
	Schools	*Enroll.*	*#*	*%*	*#*	*%*	*Lunch*	*/ Part H.*	
State Wide	253	187395	64	25%	44380	24%	38%	25%	7%
Honolulu	55	35256	(no rural schools)						
Central	41	34706	1	2%	349	1%	57%	33%	11%
Leeward	39	37110	11	28%	10,349	28%	38%	21%	5%
Windward	31	19673	3	10%	2,770	14%	39%	36%	4%
Hawai`i	39	27993	23	59%	15,071	54%	50%	38%	5%
Maui	30	21608	20	67%	13,703	63%	37%	34%	6%
Kaua`i	15	10962	6	40%	2,138	20%	43%	27%	7%

The island of *Hawai`i* is by far the largest in the state. Ranching and agriculture occupy much of the productive land, and over half the schools are rural/small town. Free and reduced lunch rates for individual schools range up to 74%, and school populations range from one third to one half Hawaiian or part-Hawaiian.

The *Kaua`i* district includes the islands of Kaua`i and Ni`ihau. Most of the district's elementary schools are rural, but feed into mid-size town intermediate and high schools. The single school on the private island of *Ni`ihau* is particularly unusual: serving a 100% Hawaiian population, instruction in this school begins in the Hawaiian language, and English is introduced as a second language. Hence, 76% of the students are classified as English as a Second Language Learners (ESLL).

The *Maui* district includes the islands of Lana`i, Maui, and Moloka`i. Maui proper has the bulk of the schools, over half of which are rural/small town in traditionally agricultural settings. Hawaiian/Part Hawaiian populations approach 100% at Keanae (along the Hana coast). *Moloka`i* is entirely rural. Four elementary schools, some with Hawaiian populations as high as 80%, feed into Moloka`i High/Intermediate, which is located in a Hawaiian Homestead Community. Of the enrollment of 833 students, 61% are on free/reduced lunch and 65% are Hawaiian. *Lana`i* has one school classified as type 4.

The *Leeward* district on the southwest coast of O`ahu is the most rural and impoverished district on the island. Nearly a third of the schools are rural/small town. Students come from a wide range of cultural and economic backgrounds, comprising a stable population of permanent residents and a more transient population of military dependents, as well as some recent immigrants. Free/reduced lunch rates for individual schools range up to 81%, and for students of Hawaiian or part Hawaiian ancestry, these rates reach 93%.

The *Windward* district covers the northeast shore of O`ahu. Three schools from this district are classified as rural/small town. The area is culturally pluralistic, with Polynesians and Caucasians as the largest ethnic groups.

O`ahu's *Honolulu* district is entirely urban. While no RSI funds will be expended in this district, we expect that Honolulu schools will benefit from the resources and models we provide to rural schools. Only one school in O`ahu's *Central* district, Haleiwa Elementary, qualifies as rural/small town.

Needs Assessment

During the development period, we conducted an in-depth needs assessment and met repeatedly with school staff and a diversity of other stakeholders to identify resources and implementation strategies. In this section we summarize this planning process and fulfill requirements for reporting results of prior NSF funding ("Hawai`i Networked Learning Communities," award No. ESR-9907894, $191,764, September 15, 1999 through August 31, 2000, extended to April 30, 2001).

Planning Events

We involved a diversity of stakeholders in the planning process by sponsoring dozens of development team and PI meetings and other events. Results of this activity are reflected in the Implementation Strategies section. Over fifty representatives of collaborating and stakeholder organizations attended a kick-off meeting on November 30, 1999. Attendees included the superintendent of schools, principals, teachers and students, curriculum specialists, University of Hawai`i faculty from a diversity of departments and deans from the College of Natural Science and College of Education, representatives from local businesses and civic groups, a teacher union representative, and many others. This event featured focus groups to develop implementation strategies and share resources. Subsequently, project directors met with numerous potential consortium members, including University disciplinary

specialists, DOE evaluation and assessment staff, and community business, cultural and environmental groups. Several events focused specifically on school engagement in the planning process. We convened two meetings of school principals and other school representatives on O`ahu for more intensive discussions of implementation strategies and overcoming potential barriers. We held small group meetings with our pilot schools on Hawai`i, Maui, and Kaua`i. These schools sought input from their own communities through forums and surveys. A conference call was held with the co-Director of our mentor initiative, the Alaska RSI. During April 17-19th 2000 we hosted NSF site visits at several of our schools as well as other sites providing scientific, technical or cultural resources for our initiative. A full day planning meeting of twenty-six consortium representatives was held on May 12th, 2000. Finally, PIs attended the October 1999 SSI meeting in Washington, the April 2000 RSI "Lessons Learned" meeting in San Diego, and the September 2000 RSI PI/PD meeting in San Antonio.

Pilot Schools

In order to engage schools deeply in the planning process, we decided to work closely with a small number of pilot schools. The candidate set included rural or small town schools with high poverty rates, high native Hawaiian or part-Hawaiian populations, and a range of grades including the middle grades (e.g., K-8, 7-12, K-12). We selected six of these schools according to their involvement in standards-based education, as well as to obtain geographical distribution across neighbor islands. Our final choice was four schools on Hawai`i (Ho`okena, Honoka`a, Honaunau, and Laupahoehoe), one on Kaua`i (Waimea Canyon), and one on Maui (Maui Waena).

School Survey

In consultation with DOE assessment staff and other evaluation specialists, we created a needs assessment instrument containing 71 questions covering a range of outcome measures and factors relevant to these outcomes. We contracted one staff member in each pilot school to gather, consolidate and report their school's information on each item. We implemented this instrument as a database-backed web site into which these contractors could enter their responses. *Outcome measures* included student achievement scores broken down by ethnicity (aggregated scores are already available from the state) and indicators of student attitudes such as attendance and graduation rates and career choices in SMET. *Relevant factors* included: curriculum content and standards alignment; instructional practices such as traditional vs. inquiry instruction and individual vs. group work; coverage of SMET topics; professional development opportunities and participation; administrative and staff support for standards-based education; attitudes of teachers and parents towards SMET careers for their children; community priorities, community involvement in the schools, and current partnerships in place; technological infrastructure and its use in support of instructional practices and professional development; and the schools' own prioritized resource needs. Summarizing the responses, we noted the following significant points:

1. *The schools were unable to provide ethnic breakdowns on achievement data and post graduation plans.* This disaggregation is available (but not normally computed) at the state level for achievement data only. Further work is needed to disaggregate graduation rates and post graduation plans in order to track impact on historically underserved populations (ESR Drivers 5 and 6).

2. *Algebra I is not a requirement at the middle grades.* Given the criticality of algebra as a gatekeeper to high school science and math courses ("Mathematics Equals Opportunity," 1997; Schmidt et al., 1999), we need strategies for making this a requirement and enabling schools to succeed at teaching it (Driver 1).

3. *Schools are aware of the Hawai`i Content and Performance Standards (described in the next section) but are not sure how to implement the standards.* Effective implementation strategies should be modeled in staff development, and teachers' own implementation efforts guided by content specialists who are suitably trained in the standards (Driver 1).

4. *Professional development focuses on standards, but does not emphasize content knowledge.* While increasing professional development on standards implementation (see #3), we need to provide more opportunities for increasing teachers' content knowledge (Driver 3).

5. *Instructional practices are largely traditional (lecture and textbook based) in science and math, but more hands-on in technology.* Teachers need to more fully understand the inquiry process and how knowledge evolves. They also need more help with process and content knowledge to facilitate this kind of learning (Driver 1)

6. *Learning situations are largely whole group and individual.* The research literature shows that small groups are best for collaborative learning (Slavin, 1990; Webb & Palincsar, 1996). We should encourage and help develop designs for small group projects (Driver 1).

7. *The use of local resources, experts as mentors, community volunteers in schools, and other community partnerships is low in SMET, particularly in technology.* Strategies are needed to engage SMET specialists and

community resources in long-term collaborative relationships with the schools. These strategies must foster mutual awareness and bridge both geographical and institutional boundaries (Drivers 3, 4).

8. *Use of technology is weak or nonexistent in science and math instruction, and occasional at best for access to outside resources, professional development, or mentoring*. Teachers may need assistance in teaching basic applications of technology to science and math problems. Given our island geography and the needs shown in items #3-7, rural schools can also benefit from better use of technology to support small group project formats in class, increase teacher access to professional development resources, and sustain mentoring relationships (Driver 3).

9. *The schools' own priorities were instructive*. Highest weight was given to professional development and release time for the same. Funding for curricular resources and more standards-based curricular resources were ranked next. We need to foster better access to existing resources and encourage the creation of new resources relevant to local needs. Community partners for school initiatives (Drivers 3, 4) received one of the lowest rankings of these choices. This could be due to the schools' lack of past experience or to negative experience with such partners. We need to increase schools' awareness that partnerships can provide professional development in content areas and improve the relevance of science and math. Equally important, we need to ensure that partners understand the demands on the schools and are prepared to work in concert with plans for standards-based education (described in the next section). The need for science assessment also received the lowest ranking. Currently, statewide standardized testing is conducted only for reading and mathematics. Administrative professional development on the use of assessment in an empirical approach to standards implementation will be of particular importance (Driver 5).

10. *Parents and teachers view SMET careers for their children as desirable, but not likely*. Of the parents surveyed, over half find science and technology careers desirable, but only 25-30% believe that SMET careers are likely for their children. The figures are 5-10% lower for mathematics. A somewhat greater proportion of teachers view SMET careers as desirable, but again 25-30% believe that such careers are likely for their charges. In a related finding, only 25% of elementary teachers surveyed feel proficient in teaching SMET topics. Further work is needed to increase parents' and teachers' confidence in their childrens' ability to achieve high standards in SMET and their ability to support their children in this endeavor (Driver 4).

The Strategic Plan for Standards-Based Education

Although we have documented many needs within Hawaii's rural public schools, we are encouraged by the substantial momentum that the Hawai`i State Department of Education (DOE) has in the area of systemic reform and standards-based education. The DOE's Strategic Plan for Standards-based Reform (Dept. of Education, 1999a) describes a set of policies (addressing Driver 2) for a comprehensive student support system that holds everyone accountable for student performance, drawing on not only teachers and classroom resources, but also on DOE expertise and the larger community to help students meet and exceed the standards (Drivers 3 and 4). The mission of the proposed initiative will be to help ensure the success of the Strategic Plan, particularly through its following components.

Hawai`i Content and Performance Standards

Research suggests that the strongest predictor of student achievement over which we have direct control is the expectations we have of our students (Paul LeMahieu, personal communication, 1999). The Hawai`i Content and Performance Standards (now in its second version, known as HCPS II) are an expression of these expectations (Dept. of Education, 1999b), and address Driver 1.

The HCPS begin with *General Learner Outcomes*: the ability to engage in complex thinking and problem solving, work collaboratively, recognize and produce quality performance and products, and take responsibility for one's own learning. While the General Learner Outcomes are common to all academic disciplines in a standards-based program, content standards target specific learner outcomes for particular disciplines in the form of the ideas, concepts and skills that all students should master. The HCPS include the following disciplines: language arts, mathematics, science, social studies, fine arts, health, physical education, world languages, career and life skills, and computer education (Dept. of Education, 1999c).

The DOE is currently developing performance indicators and concrete examples of students' work in the above disciplines. A web-site has been established for teachers to review and comment on the development of these performance standards (http://www.hcps.k12.hi.us/). A statewide, standards-based assessment program evaluating students' accomplishment of the standards in reading, writing, mathematics, and the four General Learner Outcomes at the benchmark grade levels of 3, 5, 8, and 10 is scheduled for completion by May 2001. A long-range plan for inclusion of the other content areas in the assessment and an ongoing research and development effort focused on new assessment strategies is slated for completion by January 2001. A professional evaluation program for teachers

targets completion by August 2001, for school administrators by September 2001 and state administrators by September 2002 (Dept. of Education, 1999c).

Standards Implementation Design

The Standards Implementation Design (SID) is a comprehensive framework facilitating accountability through school-level self-assessment. Each school develops their own SID within the general framework, addressing implementation of system-wide policies (Driver 2) at the school level. The school self-study process consists of seven tasks: developing the school profile; defining a school vision; developing school-wide learner outcomes; analyzing instructional and organizational effectiveness; prioritizing improvement areas and developing an SID action plan; implementing the SID action plan; and evaluating results as well as planning for continuous improvements.

Following the SID, curriculum should be challenging and relevant to Hawaii's Content and Performance Standards (Driver 1). Instruction should use research-based knowledge, implement a variety of learning experiences to meet students' diverse needs, and engage students in activities that address the standards and school-wide learner outcomes. School-wide learner outcomes define what each student should know upon completion of each grade level. These outcomes should be developed by the school community, inclusive of all students, and assessable. The SID considers parental and community involvement paramount to quality student support and to the responsiveness of the system.

The SID mandates that assessment be conducted frequently and measure each student's progress toward the school-wide learner outcomes and achievement of the standards, thereby encouraging continuous improvement of curriculum and instruction as well as determining appropriate allocation of resources. This assessment is based on six categories of criteria: standards-based learning, quality student support, professionalism and capacity of the system, coordinated teamwork, responsiveness of the system, and focused and sustained action. Observable evidence for success includes student work, interviews and observations, and hard data on performance, attendance, special needs and stakeholder perceptions.

Professional Development Credit Program

The scalability of a model of professional development based on seat time is limited by the funds and substitute staff available for release time. A seat-time model also presents an unfortunate paradox to those teachers who are dedicated to keeping up-to-date with their instruction methods: the more professional development workshops they attend to learn these methods, the more face-to-face teaching time they lose. The PD Credit program was created to address these problems, and to facilitate systemic change by focusing on results as well as practice. This innovative program rewards teachers for the development of quality standards-aligned curriculum resources and their application in the classroom (Driver 1). Traditional seat time in professional development workshops is used primarily to initiate and conclude development activities that teachers conduct outside of the formal workshop setting.

University, college and private providers as well as DOE's own offices may offer PD Credits (Driver 3). To qualify, providers must incorporate the DOE's *Elements of Quality Professional Development* and provide evidence of learning results (Driver 5). Activities must focus on the Hawai`i Content and Performance Standards by incorporating content knowledge and specific research-validated practices, such as collaborative learning techniques. The PD Credit program will increase the shared knowledge base of Hawaii's teachers by encouraging the creation and dissemination of new curriculum products, as well as ensuring student learning results.

Implementation Principles

Reflecting on our Needs Assessment and the strengths of the Strategic Plan for Standards-based Education, we developed the following principles to guide our implementation design.

Support schools in meeting the demands already upon them. During our needs assessment we repeatedly heard that Hawaii's schools and teachers are overburdened, lacking adequate time and funding for their current commitments. The only way to engage them in the initiative is to enable them to meet the demands already upon them, as indicated by the next item.

Work within the framework of the Hawai`i State Department of Education's Strategic Plan for Standards-Based Reform. We can be most effective by helping to ensure the success of the Strategic Plan, and best engage schools by helping them meet their mandate to develop a Standards Implementation Design (Drivers 1 and 2).

Leverage existing efforts and resources. Many participants in our planning process felt that Hawai`i has much of what it needs to bring SMET education to high standards, yet is hampered by insufficient awareness of and

coordination between these resources. Considering also the small amount of funds available relative to the magnitude of the problem, one of the most important roles HNLC can play is to bring together and coordinate existing efforts and resources (Drivers 3 and 4).

Take a capacity-building approach where possible, yet design for sustainable relationships with partner organizations where needed. Past experience shows that over-reliance on partners does not help (and may even weaken) the DOE when fiscal support for the partnership ends. There are two solutions to this problem. One is to design relationships with partners such that they build the capacity of the DOE. For example, rather than leaving evaluation entirely to contracted evaluators, we will require that our evaluators work with both DOE district staff and school staff, building their capacity to gather, analyze and apply data to their own decision making processes as the Standards Implementation Design requires (Drivers 5 and 6). Yet, some responsibilities cannot be transferred to the DOE. For example, professional development in the constantly changing SMET content areas must necessarily rely on disciplinary experts. In order to sustain collaborations with such persons, we must design these relationships to be rewarding to all collaborators beyond the availability of temporary grant funds (Drivers 3 and 4).

Attend to economic, ecological, and cultural relevance. Why should Hawaii's students and their families care about science, math, engineering and technology? How can we leverage Hawaii's rich SMET resources and unique cultural milieu? How can we make SMET relevant to local concerns while also fulfilling our obligation to educate better global citizens? We address these questions by attending to economic, ecological, and cultural relevance and organizing our use of resources under a theme of *global environmental studies, situated locally.* Economic development must be tied to management of our natural resources and development of a clean high-technology industry that values lifestyle and education. The sustainability of island life is a microcosm of global sustainability, and hence an opportunity for education about the latter. Our heterogeneous culture is also a microcosm of the emerging national and global multiculturalism. By designing culturally relevant curriculum we have the opportunity to become a model in the application of standards-based SMET education to a diverse population (Driver 6).

Implementation Strategies

The implementation activities that we will undertake are grouped into three broad areas of strategic concern: integrating staff training and coalition building, supporting geographically distributed learning communities with resources and collaborative tools, and taking a capacity-building approach to evaluation and assessment.

Building Capacity Together

A major activity of the Hawai`i Networked Learning Communities will be to build coalitions within Hawai`i and the Internet community in order to expand DOE staff development offerings and include all of our stakeholders in rural education. We see staff development and coalition building as closely related activities. Training of community members will enable them to work with the standards-based reform process, which in turn will enable them to provide resources for school staff development. *Staff development* will be provided throughout DOE from school staff to state leadership teams through the existing professional development infrastructure. *Awareness training* will be provided to the broader community, including PD Credit providers, parents (e.g., school volunteers and tutors), state legislators and their staff (who appropriate funds for DOE), community college and university faculty, government scientists and resource managers (who will serve as mentors to teachers in SMET curriculum development and adaptation, and as partners with teachers and their students in community based projects), and members of the business community who seek to contribute resources.

The initiative's approach to professional development will be influenced by the Professional Development Coordinating Council's (PDCC) recommendations on what, how and by whom these inservices are delivered. Established in the fall of 1999, PDCC is a 40-member committee constituted of representatives from DOE, higher education (e.g., UH Hilo, UH Manoa, University of Phoenix, Chaminade University), regional labs (e.g., Pacific Resources for Education and Learning), school administrators, teachers, unions, business and industry. This council is responsible for identifying the mission of professional development and how it will implement both short term goals (such as targeted inservice in reading, differentiated learning, and legal issues), and long term goals (such as advanced degrees in school administration, masters' degrees in content areas, and educational technology).

A Tiered Model

During the first summer we will initiate face to face training for three target groups: the professional development providers, content area partners, and teacher partners serving as liaisons in each school chosen for the Year 1 implementation. During the school year, teacher partners will continue to provide local support to other teachers in

their schools while staff development continues online. In the second summer, Year 1 schools will be partnered with teachers from Year 2 schools. The Year 1 schools will present their curriculum and share their experiences. They will then become mentors for Year 2 schools. This tiered mentoring model will continue with schools added in Years 3, 4, and 5 being mentored by partners in the previous year's schools.

Professional Development Partners

Professional development credit programs are provided by a variety of partner organizations under the lead of the DOE. Partners include the University of Hawai`i (College of Education, College of Engineering, College of Natural Sciences, School of Ocean and Earth Science and Technology, Hawai`i Institute for Educational Partnerships, Outreach College, Sea Grant College Program, Hawai`i Space Grant Consortium, UH Hilo, and several community colleges), Malama Hawai`i, MCI WorldCom Marco Polo Internet Content for the Classroom (http://www.wcom.com/marcopolo/), the Maui High Performance Computing Center, NASA's Future Flight Hawai`i, the Polynesian Voyaging Society, and the Pacific Resources for Education and Learning. (Other consortium members who may not be directly involved in professional development include TechCorps Hawai`i, the High Technology Development Corporation, and the KITV television station.) Several university faculty and community leaders known for their content expertise and teaching experience have agreed to help guide our work in their content areas. These include Gordon Grau and Malia Chow of Sea Grant for environmental sciences, Stephen Itoga for Computer Science, Dale Myers for Mathematics, and Nainoa Thompson of the Polynesian Voyaging Society and Malama Hawai`i for culturally relevant curriculum.

Awareness training for PD and disciplinary partners will familiarize coalition members with the Hawai'i Content and Performance Standards and the Standards Implementation Design process and enable them to align their support for DOE (ESR Driver 4). We will also work with PD Credit providers to develop ways in which teachers' curricular resources are disseminated via a web-accessible resource database.

School Staff

School-level staff development will include strategies for classroom teachers, principals, technology coordinators, and library media specialists to develop and incorporate standards-based lessons that include hands-on components, utilize local resources and settings, and are thematically unified with global environmental studies and the diverse cultural heritage of Hawai`i (Drivers 1 and 3). *Teacher partners* will learn to support the schools and the HNLC implementation through mentoring of other school staff and ongoing assessment. This assessment will serve as a feedback loop to help determine additional resources and training needed at the school level. School teams may participate together in early phases of their professional development to ensure a shared awareness. Later, administrators will go into separate tracks to focus on their particular needs and prevent supervisor relationships from inhibiting participants' willingness to risk innovation.

HNLC funds will enable delivery of an integrative professional development course to help teachers create, deliver, and assess standards-based curriculum that integrates science, math, technology, and social studies (Drivers 1 and 3). This 15-credit course will qualify teachers for an increase to the next pay scale level. The year-long course will begin with an intensive week-long face to face summer training session. Subsequently it will be delivered online with quarterly face to face meetings, and mentoring support from partner teachers throughout the year as needed. The course will give participants an opportunity to develop the skills that they will need to be successful online learners and introduce them to the national and state SMET and social studies standards. Participants will then explore strategies for curricular integration, problem-based/project-based learning strategies, standards-based assessment tools, and appropriate uses of technology in the classroom. They will plan and implement a project/lesson plan that demonstrates an integrated math, science, social studies and technology curriculum.

We will model this work on the DOE's Technology & Telecommunications for Teachers (T3) program (http://www.k12.hi.us/~tethree/). T3 is an innovative staff development program designed to train Hawaii's teachers in incorporating appropriate technology into their instruction, thereby enhancing student learning and preparing students for success in an increasingly technological world (http://www.k12.hi.us/~tethree/00-01). We will also leverage expertise in the University of Hawai'i at Manoa's Department of Information and Computer Sciences and Library and Information Program. Beginning in the third year, ICS/LIS will develop follow-up courses suitable for DOE staff in areas such as the use of computational media for communication, collaboration and learning.

Administrators are key to the success of this initiative. Administrative professional development will focus on the Standards Implementation Design (SID) system, particularly to enhance the implementation of SMET education. This work spans all Drivers, especially 1, 2, 5, and 6. It will address the use of assessment data to guide implementation planning, and address how technology can provide support for the SID process. It is critical that the initiative supports administrators to meet the demands already upon them rather than present them with what they

might see as one more thing to do. By focusing our training on support for the SID process we are addressing their immediate needs while also building capacity and ensuring sustainability beyond the funded period. Administrators will have already completed one cycle of training in the SID by January 2001. We will perform an assessment of the needs of principals in the implementation of the SID, and based on this data, work with a team of principals, teachers, and educational officials to develop a staff development program for the principals.

State Staff and Leadership

Improved assessment and evaluation capabilities will be crucial to the success of the Strategic Plan, particularly the school level planning process, as well as to evaluation of the Hawai`i Networked Learning Communities initiative. Under the guidance of contracted evaluators, HNLC will work with the DOE Offices of School Renewal and of Planning and Evaluation to build capacity in areas such as science assessment, disaggregation by special populations, and tracking of post-graduation plans (Drivers 5 and 6).

We will provide both the Education Cabinet and the Board of Education with awareness training concerning the Hawai`i Networked Learning Communities initiative (Driver 2). The *Education Cabinet* is the primary entity for all departmental initiatives, which are approved by the Board of Education. It includes the superintendent and his deputy, assistant superintendents, district superintendents and their deputies, division directors, union representatives, the director of Planning and Evaluation, and the DOE auditor.

Community Outreach

HNLC will establish a series of regional and state forum sessions where community, business and parent stakeholders can meet to (a) discuss ways to contribute to the project and (b) enhance their working partnerships with schools (Drivers 3 and 4). These meetings will also create opportunities for us to showcase model partnerships.

Outreach to parents will leverage the Parent Community Network Coordinators (PCNC). The PCNC helps to develop a sense of community in and among home, classroom, school, and neighborhood, creating supportive networks for personal development, student achievement and well being. We will provide training and tools for these parents to work with their school communities. Working with the PCNC and other community organizations, we will convene regular community forums to provide more information about the initiative and how it can support schools. Our directory of community contacts will expand from these forums.

We will also develop awareness training for the business and industry communities and for the state Legislature and their staff to describe how the initiative will help schools meet the content and performance standards in math, science and engineering, discuss strategies for implementation in rural communities, and identify community and fiscal support required.

Virtual Community Center

We have documented the needs for improved awareness and dissemination of SMET curricular resources and for training and mentoring school staff in the selection and adoption of resources in service of standards-based education and in the use of ongoing evaluation as part of the Standards Implementation Design process. Yet our island geography can place barriers between these resources and those who need them. Hence we will use Internet technology to bridge geographic and institutional barriers. Educators and their partners will find curricular resources, collegial support and mentoring, collaborative projects, and support for evaluation in a Virtual Community Center.

Interactive Resource Database

The Virtual Community Center will gather descriptions of SMET-related resources available to educators in the state of Hawai'i in one on-line location. The scope will be broad, including curricular materials, products of the PD Credit program, Standards Implementation Designs and evaluation plans, suggested educational software programs, mentoring by disciplinary experts, environmental education projects, and online advanced-placement courses. Entries will be indexed by the Hawai`i Content and Performance Standards that they address, as well as by other relevant attributes such as grade level, content area, and type of resource. We will focus initially on local resources and use standard metadata formats to foster interchange with other repositories such as GEM (http://www.geminfo.org/) and NEEDS (Muramatsu et al., 1999). This work was piloted during our development period (Suthers, 2000a).

Initially, HNLC project staff will populate the database. As the system grows, we will recruit curriculum specialists, resource teachers, and librarians to help us build the resource base. Perhaps the most important contributions to the database will come from teachers and other school staff engaged in the DOE's product-oriented

PD Credit program. We view this program as having tremendous potential in building the repertoire of standards-based curricular resources available to schools, particularly in leveraging local SMET resources (Drivers 1 and 3).

Electronic access will be provided via a World Wide Web interface providing browsing and search capabilities. Additionally, a printed HNLC newsletter will be mailed to all schools, and will include announcements of new resource additions as well as upcoming events, to ensure that those who do not regularly inhabit cyberspace are kept informed. Yet this *interactive* resource database will not be solely an archive. A discussion forum will be associated with each contributed resource. This forum will enable teachers to ask the resource author about how to use the resource, and to discuss their adaptations and experiences with other users of the resource. Such commentary will greatly enhance the value of the resource database, not only in terms of facilitating effective use, but also in establishing relationships between educators with each other and with outside resource providers. This work will take place as part of a more general framework for online collaborations in support of learning, described below.

Discourse about Artifacts in Problem-Based Learning

Many of the scenarios proposed during our development activities involve collaborative projects between students, teachers and other collaborators and mentors (such as scientists) engaged in asynchronous collaboration on SMET problems over periods of time ranging from weeks to months (Drivers 3 and 4). Some of our most exciting scenarios involve students in authentic ongoing research or environmental projects. Networked collaboration technology will enable students and teachers in isolated rural schools to participate in these projects. Participants may work with disciplinary data sources such as field observations, weather station readings, or images from telescopes or remote sensing, and collaborate to interpret this data and construct hypotheses or models. Since they are geographically distributed, participants must rely on the computer medium to provide appropriate representations for this work. The HNLC Virtual Community Center will provide each online collaborative project with its own workspace that supports the collaborations between students, teachers, and community mentors such as scientists. These workspaces will be designed to integrate online discourse with the disciplinary and knowledge artifacts being examined and constructed by participants (Turoff et al., 1999; Suthers, 2000b). The same technologies will be used to support school staffs' professional discourse about curricular resources such as the products of PD Credit work, described in the previous section.

Telementoring

The Virtual Community Center will manage a pool of volunteer mentors, such as SMET faculty, business and government employees, and other community members who are willing to lend their expertise to school staff and students over the network (Driver 3). Training will be provided to the mentors on how to develop a relationship with students and teachers, and on the essentials of standards-based education (Driver 4). Mentoring relationships will be initiated with face to face meetings, where possible, to enable participants to develop trust and mutual understanding before entering into primarily electronic modes of communication. Summer shadowing and internships can be used to strengthen the partnerships developed over the school year.

We will support long term relationships that build the skills of school staff, educate students, and prove rewarding to mentors, unlike one-shot "ask an expert" approaches. The Virtual Community Center will keep track of mentors' preferred mentoring workload so that new requests will be matched to those who have the time available (O'Neill & Gomez, 1998). Mentoring will be undertaken in the open, with on-line collaborative discussions made visible to others participating in mentoring relationships (except where interlocutors request privacy). This method has been found to improve the quality of mentoring, because mentors can observe effective strategies used by others, and mentees learn what they can expect of their mentors (O'Neill & Scardamalia, 2000). In this design we are building on the experience of colleagues who have supported mentoring relationships in the context of the CoVis (Pea, 1993) and CSILE/Knowledge Forum (Scardamalia & Bereiter, 1994, 1996) projects.

School Implementation Design Evaluation Center

During the development period our needs assessment was supported by a Web interface to a database on our server (http://lilt.ics.hawaii.edu/hnlc/data.html). This facilitated the collection, over time and by multiple individuals, of a variety of data from our pilot schools. We plan to improve upon and continue the use of Web and database technology to support the participation of all stakeholders in the evaluation of our initiative (Drivers 4, 5 and 6). This work will take place in collaboration with both staff from the DOE Planning and Evaluation office and contracted evaluators.

Recognizing the significant role that evaluation plays in the Standards Implementation Design and the burden this places on schools not versed in evaluation techniques, we will provide schools with online support for their SID evaluation efforts. Each school will customize the data to support their local decision-making. We will offer to host the school's database and provide the Web interface on our server, relieving schools of the burden of

setting up and maintaining the technology themselves. Schools could later elect to move to servers at their own site, or to adopt the design to a paper-based approach. Yet they may elect to stay within the virtual community center for its easy access to the resources that address their identified needs and to discussion with peers at other schools concerning standards implementation issues.

Evaluation and Assessment

Evaluation should be designed from the point of view that HNLC seeks ultimately to improve SMET achievement and aspirations of students who live in isolated and underserved rural communities. However, HNLC itself does not have the resources to directly solve the problems these schools face. Rather, HNLC's role is to build the capacity of the schools and their communities to leverage their own resources and improve SMET instruction in a sustainable way. Thus, evaluation should assess ways in which HNLC's interventions impact student achievement and students' subsequent career choices by influencing systemic factors that affect these outcomes, or show the potential to do so via a logic model. These systemic factors are the ESR Drivers, in terms of which we discuss our evaluation plans.

Tracking the Drivers

Driver 1: Implementation of a comprehensive, standards-based curriculum and/or instructional materials available to every student. Evaluation will focus on progress in implementation of the Hawai`i Content and Performance Standards in the curriculum throughout the rural schools and the role of HNLC interventions in accelerating the pace of this implementation. Specific objectives will include increases in: (a) staff development hours, (b) staff development offerings in SMET, (c) schools with standards-aligned SMET curricula, (d) peer-reviewed SMET curriculum units and lessons, (e) use of alternative assessment tools, (f) inquiry based lessons and units, and (g) culturally relevant and place-based lessons and units. Documentation of professional development activities and classroom practices will be gathered through the schools' SID self-study (recorded in our online evaluation database), and corroborated by the direct observations of project staff and the external evaluator.

Driver 2: Development of a coherent, consistent set of policies that supports provisions of broad-based reform of mathematics and science. We enter the implementation phase with policies on hand in the form of the Strategic Plan. Systemic implementation of these policies requires that they be translated into school-level policies and improved operational procedures of state-level DOE offices. External evaluators will document changes based on DOE policy documents related to SMET (including incentives, infrastructure changes, etc.) corroborated by surveys and interviews to assess levels or degrees of policy implementation. School-level policy changes will also be documented through the SID process. A specific objective is an increase in schools requiring Algebra at Grade 8.

Driver 3: Convergence of all resources … into a focused program that upgrades and continually improves the educational program in science and mathematics for all students. Specific objectives include increases in (a) the number of volunteers and mentors in schools, (b) school utilization of local SMET resources (both were documented to be low in the needs assessment), (c) engagement of disciplinary partners in SMET professional development and curriculum development, (d) sustainability of these partnerships beyond extramural funding, (e) matching funds and in-kind support from various organizations and agencies (f) coordination among funding sources, and (g) the extent and quality of technology and telecommunications use in SMET. We will also document meetings and forums conducted in support of the initiative.

Driver 4: Broad-based support from … segments of the community for the goals and collective value of the program that is based on an understanding of the ideas behind the program and knowledge of its strengths and weaknesses. Evaluation of Driver 3 addresses the extent of engagement of community partners. Driver 4 focuses on their understanding of standards-based SMET education and their ability to support the same. The impact of our awareness training will be evaluated by surveying stakeholder groups to determine the extent to which they can articulate their role in supporting implementation of the Strategic Plan. We will pay particular attention to the alignment of supporters' work with the HCPS or the SID as appropriate for each stakeholder group (for example, whether the Driver 3 engagement of disciplinary partners is standards-driven).

Driver 5: Accumulation of broad and deep array of evidence that the program is enhancing student achievement through a set of indices. Specific objectives include increased (a) scores on science and math achievement tests, (b) enrollment in higher level math and science courses, (c) high school graduation rates, (d) students seeking and gaining admission to postsecondary education, and (e) percentage pursuing SMET careers. The DOE currently gathers norm-referenced achievement data statewide in mathematics and reading on a yearly basis. The DOE is also working with Harcourt Educational to develop the Hawai`i Assessment Program (HAP), a criterion referenced HCPS II assessment. The tests will be administered to all students in grades 3, 5, 8 and 10 in 2001 for reading, writing and math. The greatest need is in the area of science assessment. The DOE is discussing with WestEd the development of a Hawai`i version of the Partnership for Assessing Science Standards (PASS) which is

based on national standards. HNLC schools will pilot this test, providing us with baseline data in science as well. Alternative assessment, particularly authentic assessment, of science learning is of growing concern within our communities. We must implement better ways to assess science inquiry skills and disciplinary ways of knowing. Our professional development activities will address this matter. Assessment may take the form of performance observation checklists, learning logs and journals, and rubrics that assess the learning process as well as products (Barber, 1995; Brown & Shavelson, 1996; Germann & Aram, 1996; Luft, 1998; Sharma, 1996).

Driver 6: Improvement in the achievement of all students, including those historically underserved … evidence that clearly demonstrates that, to a significant degree, changes in student achievement and performance can be attributable to the catalytic impact of the SI. The specific objectives are the same as Driver 5, but focus on students who have been historically underserved. The information is available to disaggregate the statewide mathematics and reading data by ethnicity, although this is not currently done as part of regular practice. We will work with the DOE Office of Planning and Evaluation and other relevant offices to ensure that the disaggregation of test data is done on a yearly basis. We will also work with schools to enable future disaggregation of graduation rates and post graduation plans. Particular attention will be paid to the native Hawaiian subpopulation, although other populations of special concern exist within our diverse communities and will be tracked.

Evaluation Partnerships

A primary objective of our evaluation strategy is to build capacity for ongoing evaluation beyond the NSF-funded period. Therefore, many aspects of evaluation will be handled by project personnel in conjunction with the Hawai`i DOE. The role of an external evaluation team will be to consult with the HNLC evaluation team, as we seek to improve both our program and the evaluation process itself. External evaluators will assist in the *formative evaluation* process by providing staff development in evaluation design with an emphasis on clear identification of formative evaluation questions and the documentation needed to answer those questions, developing an "Evaluation Handbook" for project personnel to guide their evaluation activities, and meeting with HNLC staff to review HNLC evaluation plans, activities, and results. The external evaluator will provide *summative evaluation* services in coordination with HNLC staff by developing a formal evaluation design based on a logic model that links identified needs, proposed activities, and expected outcomes; identifying the key outcomes for the purposes of summative evaluation (see Driver discussion above); designing and/or reviewing instruments and procedures to collect data indicative of these outcomes; and working with the Hawai`i DOE to disaggregate data from extant databases. HNLC staff will do much of the actual data collection by administering surveys and computerized feedback from program participants. However, external evaluators will conduct some of the data collection, such as direct observations, in order to ensure objectivity and credibility, and will also assist with analyzing data, including the data from extant DOE databases.

We are dedicated to documenting concrete outcomes in SMET learning and career choices, as well as tracking and understanding systemic factors believed to influence those outcomes. The overriding consideration for both formative and summative evaluation is that logical links between the objectives of the program and the data used for evaluating the program be clearly communicated.

Examples of Synergistic Activities

In our development proposal (http://lilt.ics.hawaii.edu/hnlc/pdfs/HNLC-Proposal.pdf) we offered three scenarios, in Community-based Research in Astronomy, Remote Sensing for Field Ecology, and Restoring an Ahupua`a, to convey our vision of how we will leverage Hawaii's rich resources for the education of our children. These scenarios provided examples of how we will leverage technology to support *networked learning communities*, or heterogeneous groups of people bound together by their mutual interest in certain places and activities. They are now under active development and implementation under other funding. During the development period we convened teams of community members, school staff, and university faculty to develop further plans for leveraging local resources for systemic reform and innovation in science and technology education. Examples of these activities are provided below to illustrate the ways in which HNLC will draw upon Hawaii's intellectual, natural, technological, and cultural resources in service of standards-based reform.

Wireless Environmental Mapping

Contributed by Alan Nakagawa, Honoka`a School

Schools on the Hamakua Coast of the Big Island recently procured funding to develop a wireless network that supports distributed learning activities. This will allow students to participate in project based, real world

applications of technology while gaining skills in SMET content areas. HNLC support will be leveraged to develop cooperative partnerships and provide models for implementation on a larger scale.

Geographic Information Systems (GIS) are computer programs designed to analyze spatial data, and create an ideal method for investigating relationships in the environment. By using GIS, students may analyze data in their own schoolyards or in the field by building and accessing databases disclosing information such as area, species present, and patterns of use. Global Positioning Systems (GPS) can be used to supplement the data gathered through GIS by allowing students to precisely locate and identify data points of interest. The GPS is a worldwide radio-navigation system using satellites as reference points for determining geographical locations with a high degree of accuracy. GPS will allow students to identify specific longitude, latitude and altitude of identified resources, such as endangered plants. This data can then be compiled into a database and displayed in a GIS map for analysis.

A wireless network will allow learning to take place anywhere and at anytime, and will connect schools as they collaboratively collect data to address issues in their communities. Numerous research opportunities can emerge from this network. For example, experts can assist students at any time or location, even in the field, while schools develop a growing database on native plant species. Since digital photos and GPS data will be continually entered over several years, students can observe emerging trends as they conduct research in a way never before possible in a one-year class. This project will teach not only standards-based scientific skills, but also fluency with cutting edge technology and research tools necessary for student success in an increasingly technological world.

Multidisciplinary Studies on Endangered Species

Contributed by Robyn Guadiz, Stephen Nemeth, and Penrod Vladyka, Laupahoehoe Schools

The coordinator of the Hawai`i Forestry and Communities Initiative is partnering with the Big Island's Laupahoehoe High School (LHS) to develop an interdisciplinary standards-based program focused around an endangered species botanical garden. The botanical garden will function as a "nurse forest" to regenerate native species in an understory favorable for establishment of native dryland forest plants. Seeds and plants will then be distributed to the community for reforestation of the local area. As it grows, the nurse forest will be under-planted with other endangered and rare Hawaiian plants to form a viable plant and seed bank for the school and community.

Leveraging of this project will allow students to learn the standards through collaboration in the field with teachers, students, community members and experts. Fieldwork will touch on the core subjects of math, science, social studies and English, as well as the vocational subjects of bio-agriculture and business/entreprenueurship. Math and science teachers will train students in sampling soil for composition, pH levels, and nutrients. Students can then analyze this data through graphical and statistical means. The bioagriculture class will develop a nursery of these plants using different types of soil and then market them. The business class will gain skills in math and accounting by monitoring the sale of plants, and will develop a website for the project. The social studies class will research the plants for their cultural significance. English classes may create a brochure to increase the public's awareness of these endangered species. This multidisciplinary research will then be compiled by the business class for presentation on the website.

Training, Internships and Mentoring in Global Environmental Studies

Contributed by Priscilla Billing and Malia Chow, Sea Grant

The University of Hawai`i Sea Grant College Program promotes the understanding, sustainable use and conservation of marine resources through university-based research, education, community outreach and communication services. Sea Grant's Extension Service acts as the outreach and public education arm of the program by providing technology transfer and community outreach services on issues related to economic development, coastal ecosystem health and public safety, and education and human resources. HNLC will collaborate with Sea Grant in providing teacher training and professional development, professional and student internships, and a student-mentoring program.

For teacher training and professional development, the nationwide *COAST/Operation Pathfinder Institute* trains science teachers in the marine sciences, and assists them in developing curricula for their classrooms. The DOE will assist UH faculty in converting knowledge gained from this program into on-line classroom applications. The Professional Environmental & Marine Sciences Internship training program will also offer specialized training to marine science teachers at the University of Hawai`i and the Hawai`i Institute of Marine Biology facilities. UH faculty and graduate students will team with teachers to design on-line marine science workshops and courses offered for credit.

The *Student Science Mentoring Program* motivates students throughout Hawai`i to gain a head start in marine science careers. The program will match selected high school and undergraduate students with professional researchers and graduate students as mentors, so that they may gain hands-on experience in laboratory facilities at

the UH School of Ocean and Earth Science and Technology and its Hawai'i Institute of Marine Biology. Core course credits will be secured through E-School/E-Academy.

Culturally Relevant Curriculum

Contributed by Diana Ka`apana Oshiro, Assistant Superintendent, DOE

The Polynesian Voyaging Society is dedicated to rebuilding pride in Hawaii's heritage and educating the public about respect and responsibility for our special island home. For over 25 years, the Society has worked to recover traditional Polynesian ways of knowing by building accurate replicas of ancient voyaging canoes and navigating them successfully, without instruments, over ancient migration routes throughout the South Pacific. The Society shares this knowledge through public presentations, interviews and live email chat between expert voyagers and school groups. The voyaging canoe Hokule`a can be used as a metaphor for sustainability. Hokule`a's journeys allow us the opportunity to infuse the concept of *sustainability* into the curriculum and create a cross-disciplinary prototype using science, mathematics and technology not only in content area studies, but as instruments in generating new knowledge.

Malama Hawai`i is a partnership of organizations, community groups and individuals caring for Hawaii's environment, education, economy and cultures. Through strategic networking, public awareness campaigns, educational programs, website development, community surveys, demonstration projects and other activities, Malama Hawai`i serves as a catalyst in shaping a common vision for our future.

The Polynesian Voyaging Society and members of Malama Hawai`i will assist the Hawai`i State Department of Education in the development and dissemination of culturally relevant curriculum on voyaging and stewardship. In partnership with HNLC, the Polynesian Voyaging Society will also build on the voyaging canoe metaphor and expand its themes of exploration and the sustainable care of Hawaii's land and people.

Management Plan and Timeline

Management Plan

A *management team* consisting of the Project PIs, the Project Director, a Teacher Partner Leader, and a Staff Development Coordinator will oversee the project. The *Project Director* (to be hired) will handle administrative decisions, plan events, coordinate evaluators' access to schools and DOE databases, and maintain communication between the PIs, HNLC staff, school staff, and partner organizations. The *Staff Development Coordinator* will coordinate training needs for teacher partners, administrators, librarians, parents, and mentors such as scientists and technologists, and awareness sessions for legislators, the Education Cabinet and Board of Education, and stakeholder organizations. The *Teacher Partner Leader* will coordinate the activities of teacher partners and works with the staff development coordinator to plan and develop training for teacher partners. The management team will coordinate work on a daily basis through email. Monthly *project staff* meetings will be held between the management team and other HNLC staff (DOE staff, research professionals and graduate students). These meetings may also include evaluators, scientific advisors, teacher partners, and other consultants and stakeholder representatives as appropriate. The *advisory board* will meet with the management team at least once a year, and will be provided with reports on a monthly basis. The *contracted evaluator* will report evaluation results to the management team on a yearly basis immediately after the end of each school year, enabling the management team to adjust the next year's plans and project staff to adjust the summer training sessions accordingly. Evaluators will also work with the management team and other project and school staff on a regular basis to guide formative evaluation.

Yearly Timeline

Year 1

During the first two quarters of the initiative (expected to be spring and summer 2001) we will hire personnel and train them on the Standards Implementation Design (SID), Hawai`i Content and Performance Standards (HCPS), and HNLC's role in the Strategic Plan; confirm and establish the advisory board; contract with an external evaluator; establish initial priorities; and initiate coordination with stakeholders. Staff will research exemplary programs, integration of SMET instruction, and collaborative technologies. The evaluator will work with HNLC staff to plan a capacity-building approach to evaluation in which all stakeholders participate. We will install the Virtual Community Center server platform, expand the existing HNLC web site on this server, initiate the resource database with a directory of community experts and resources, and provide web-based access to this database. Later in the year we will work with evaluation contractors and school staff to set up databases and web interfaces for the schools' SID self-assessment and evaluation processes.

During the first quarter of the funded period (or earlier) we will identify 10 rural schools to form Cohort A. In order to focus limited resources we will begin with schools containing the middle grades (K-8, intermediate or junior high). We will recruit teacher partners from these schools, and identify SMET staff teams within the schools. The following activities will be repeated on a yearly basis for each new cohort. We will prepare HNLC orientation and staff development in the spring and provide this training to administrators, teacher partners and SMET teams from the new cohort schools during the summer. Staff development for SMET teams will continue during the year aided by teacher partners. This training will include the SID, integrating curriculum to achieve standards in HCPS II, developing inquiry-based learning experiences, incorporating local resources in the learning, using technology for collaborative learning in a virtual environment, and will culminate in collaborative curriculum planning sessions.

Community awareness training for stakeholders such as parents, community organizations, business partners, legislative staff, the Education Cabinet and the Board of Education will be updated and provided yearly.

Year 2

In the second year we will ramp up activities by identifying 10 additional schools for Cohort B at the middle and elementary levels. The activities identified in Year 1 and prior discussion will be continued in Year 2 with modifications as required by the evaluation and other feedback. In addition, Cohort A and teacher partners will receive further professional development to facilitate their mentorship of Cohort B schools. These mentoring partnerships will be initiated in training workshops and continue through HLNC on-line communication systems. We will build up the resource database substantially with online staff development modules, videos of effective instructional strategies, exemplary curricular resources linked to the HCPS, virtual field trips, and suggested instructional and collaborative tools. We will also enhance the Virtual Community Center's capacity to handle moderated forums, to support artifact-intensive collaborative projects over the Internet, and to manage telementoring.

Year 3

In the third year 15 additional schools will form Cohort C. These schools may include all K-12 grade levels. Cohort B will receive further professional development to facilitate their mentorship of Cohort C schools, a privilege that will be shared with Cohort A. Other activities identified in Year 1 will be continued with modifications. Beginning in the third year, the Department of Information and Computer Sciences (ICS) will offer staff training in the use of technology for collaboration and communication and evaluation to DOE staff, enabling them to take the next step beyond the professional development provided by DOE in the first two years.

Year 4

In this year we will add 15 K-12 schools for Cohort D. Cohort C will receive further professional development to join Cohorts A and B as school mentors. Technology transfer of the Virtual Community Center server from ICS to DOE will begin in the latter part of Year 4, and will be supported by staff development.

Year 5

In the final year we will identify the approximately 15 remaining rural K-12 schools for Cohort E. Cohort D will receive further professional development and mentor Cohort E. We will complete technology transfer to DOE, and external evaluators will conduct the summative evaluation.

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Germann, P.J., & Aram, R.J. (1996). Student performances on the science processes of recording data, analyzing data, drawing conclusions, and providing evidence. Journal of Research in Science Teaching, 33, 773-798.

Luft, J. (1998, January). Rubrics: Design and use in science teacher education. Paper presented at the Annual Meeting of the Association for the Education of Teachers in Science, Minneapolis, MN. (ERIC Document Reproductive Service No. ED 417 145).

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Available: http://www.dlib.org/dlib/april99/muramatsu/04muramatsu.html

O'Neill, D. K., & Gomez, L. M. (1998, November). Sustaining mentoring relationships on-line. Paper presented at the ACM Conference on Computer-Supported Cooperative Work, Seattle, WA.

O'Neill, D. K., & Scardamalia, M. (2000). Mentoring in the open: A strategy for supporting human development in the knowledge society. Paper presented at the ICLS 2000 International Conference on the Learning Sciences, Ann Arbor, MI.

Pea, R. D. (1993, May). Distributed multimedia learning environments: The collaborative visualization project. Communications of the ACM, 60-63.

Scardamalia, M., & Bereiter, C. (1994). Computer support for knowledge-building communities. Journal of the Learning Sciences, 3(3), 265-283.

Scardamalia, M., & Bereiter, C. (1996, November). Engaging students in a knowledge society. Educational Leadership, 54, 6-10.

W. H. Schmidt, C. C. McKnight, L. S. Cogan, P. M. Jakwerth, & R. T. Houang (1999). Facing the consequences: Using TIMSS for a closer look at U.S. mathematics and science education. Boston: Kluwer Academic Publishers.

Sharma, M.C. (1996). Assessment of mathematics learning. Math Notebook, 10, 1-52.

Slavin, R. E. (1990). Cooperative learning: Theory, research, and practice. Englewood Cliffs, NJ: Prentice-Hall.

Suthers, D. (2000a). Using learning object meta-data in a database of primary and secondary school resources. To appear in Proceedings of the International Conference on Computers in Education, November 21-24, 2000, Taipei, Taiwan.

Suthers, D. (2000b). Integrating discourse, disciplinary and knowledge representations in knowledge building environments. Paper to be presented at the International Workshop on New Technologies for Collaborative Learning, November 21-24, 2000, Kobe, Japan.

Turoff, M., Hiltz, S. R., Bieber, M., Fjermestad, J., & Rana, A. (1999). Collaborative discourse structures in computer mediated group communications. Journal of Computer Mediated Communication, 4(4). Online: http://jcmc.huji.ac.il/

Webb, N. & Palincsar, A. (1996). Group processes in the classroom. In D. Berlmer & R. Calfee, (Eds.), Handbook of educational psychology. New York: Simon & Schuster Macmillian.

Principal Investigators

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Professional Preparation

Undergraduate:
University of Hawaii, Secondary Education/English, BEd, 1964.

Graduate:
University of Hawaii, Secondary Education/English, MEd, 1966
University of Hawaii, Library Studies, MLS, 1976.
University of Hawaii, Curriculum and Instruction/Library Science, EdD, 1982.

Positions Held

1993-present: Associate Professor, Library and Information Science Program, Dept. of Information and Computer Sciences, University of Hawaii.

1980-1993: Specialist, School Library Services, Hawaii Department of Education.

1977-1980: Library Media Specialist, Kalihi-Kai Elementary and Puuhale Elementary, Hawaii Department of Education.

1972-1977: Curriculum Writer, Hawaii Curriculum Center, University of Hawaii.

1966-1973: Teacher, Kaiser High, Kalani High, and Kaimuki Intermediate, Hawaii Department of Education.

Publications Most Closely Related to Proposal

Donham, J., & Harada, V.H. (2000). Information literacy. In K. Seidel (Ed.), Assessing Student Learning: A Practical Guide [CD-ROM]. Cincinnati, OH: Alliance for Curriculum Reform.

Harada, V.H., & Muronaga, K. (1999). Building teaching partnerships: The art of collaboration. Teacher-Librarian, 27, 9-14.

Harada, V.H. (1998). Building a professional community for student learning. Knowledge Quest, 26, 22-26.

Harada, V.H. & Tepe, A. (1998). Pathways to knowledge. Teacher Librarian, 26, 9-15.

Harada, V.H., & Yoshina, J. (1997). Improving information search process instruction and assessment through collaborative action research. School Libraries Worldwide, 3, 41-55.

Other Publications

Harada, V.H., & Yoshina, J. (1998). The missing link: One elementary school's journey with assessment. School Library Media Activities Monthly, 14, 25-29.

Harada, V.H., & Donham, J. (1998). Information power: Student achievement is the bottom line. Teacher Librarian, 26, 14-17.

Harada, V.H., & Yoshina, J. (1997). Using technology to cultivate thinking dispositions. Technology Connection, 3 (10-11), 27.

Nahl, D., & Harada, V.H. (1996). Composing boolean search statements: Self-confidence, concept analysis, search logic, and errors. School Library Media Quarterly, 24, 199-207.

Harada, V.H., & Nakamura, M. (1994). Information searching across the curriculum: Literacy skills for the 90's and beyond. Catholic Library World, 65, 17-19.

Synergistic Activities

Award for Innovative School Library Research
Received the American Association of School Librarians/Highsmith Research Award (1999) for project entitled, *Study of Dialogic Journaling with Elementary Grade Students as a Means to Deeper Student Understanding of the Information Search Process*. V. Harada (PI), C. Sato and J. Yoshina (Hawaii Dept. of Education).

Course Development
Designed a course, *Information Literacy and Learning Resources,* to address issues of information literacy education in K-12 school settings with emphases on curriculum design, inclusion of interactive, inquiry-based pedagogy. The course, which features on-line and interactive television components, is offered to students in the College of Education as well as the LIS Program.

Collaborative Professional Development
Served as director of *Building Teaching and Learning Partnerships,* a cooperative project with the Hawaii Dept. of Education and Hawaii Association of School Librarians. We received a ABC-CLIO outstanding leadership grant (1999) to seed this project, which focuses on face-to-face and on-line training of K-12 school teams in designing integrated curriculum units.

National Leadership
Served on a 4-member Editorial Task Force for the publication of Information Power: Building Partnerships for Learning (1998), the current national guidelines for school library media programs. Also chaired the *Learning Through the Library* Task Force for the American Association of Librarians; the goal being dissemination of best practices and current research in information literacy education to educators worldwide.

Collaborators & Other Affiliations

Collaborators within past 2 years:
Jean Donham (U. Iowa), Carol Kuhlthau (Rutgers), Ann Prentice (U. Maryland), Marjorie Pappas (CL Associates), Ann Tepe (Follett Software), Nancy Everhart (St. John's), Jayne Moore (Maryland DOE), Steven Hoffman (American Association of School Librarians), Vicki Kajioka (Hawaii DOE), Curtis Ho (U. Hawaii), Daniel Suthers (U. Hawaii), Helen Gokan (Hawaii DOE), Donna Shiroma (Hawaii DOE), Claire Sato (Hawaii DOE), Joan Yoshina (Hawaii DOE).

Graduate and Postdoctoral Advisors:
Dissertation: Richard Alm, Charles Araki, Frank Brown, Morris Pang, and Sarah Vann (Univ. of Hawaii).

Thesis Advisor and Postgraduate Scholar Sponsor:
No thesis advisorships (students elect non-thesis option). No postdoctoral scholarships. Number of master's candidates advised in last 5 years: 90.

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Professional Preparation

Undergraduate
University of Hawaii, Psychology, B.A., 1965
University of Wisconsin (no degree), 1961-1963

Graduate
Professional Certificate in Social Studies Education, 1966
Graduate Certificate Program in Telecommunication and Information Resource Management, 1991

Appointments

1996-present: E-School and Magnet E-Academy Director, Hawaii Department of Education (HSDOE), Division of Learner, Teacher and School Support (DLTSS)
1994-present: Advanced Technology Specialist: HSDOE, DLTSS
1988-1993: Distance Learning Resource Teacher: HSDOE, Office of Instructional Services
1966-1988: Social Studies Teacher, Highlands Intermediate School

Publications Most Closely Related to Proposal

Kajioka, Vicki (1999, March). Hawaii Department of Education E-School. Hawaii Web and Internet News.
Kajioka, Vicki (1998, November). Making your technology plan a powerful fundraising tool. Presented at the Grants and Funding for Technology eSchool News Communications Group Conference.
Kajioka, Vicki (1998, October). E-school: School for the 21st century. In Proceedings of the Global Learning in the 21st Century Conference. Copenhagen.
Kajioka, Vicki (1998, April). Building the infrastructure for a 21st century school. Technology and Learning.
Kajioka, Vicki (1998, April). 21st century classrooms: Japan-U.S. common agenda, Hawaii Web and Internet News.
Kajioka, Vicki & Koide, Kerry (1994). E-mail LAN. In Pacific Telecommunications Conference Proceedings.
Chang, Carolyn, Lei Odo Masuda &Vicki Kajioka (1973). Our Cultural Heritage: Hawai`i Curriculum Resource Guide. Governor's Committee Hawaiian Text Materials.

Synergistic Activities

E-School and Magnet E-Academy
Directs E-School, a 1996 U.S. Department of Education Technology Innovative Challenge Grant to develop a virtual school and Magnet E-Academy, an onsite and virtual program. Developed and refined E-School online, interactive, problem-based learning model for high school credit courses. Broadened the opportunity for high school students statewide to enroll in technology courses through the Magnet E-Academy Program.

Advanced Technology Research
Coordinates the Advanced Technology Research team, a group that pilots the integration of technology into the curriculum projects that can be replicated throughout the Department of Education. This team has received more than $6.8 million in grant funding.

Program Development
Expanded the opportunity for educators throughout the State of Hawaii to participate in an interactive distance learning Technology and Telecommunications for Teachers Training Program (T3) that utilizes the Internet and video conferencing. Taught the Telecommunication Services T3 course 3 years, 1994-97 and the Transformation of Learning T3 course. 1996-1997.

Pioneered Online E-Mail System
Pioneered an online email and bulletin board system through the development of the Hawaii Learning Link on-line telecommunication service. Conducted staff development and managed and operated the Xenix-based system. 1988-1996.

Workshop and Conference Tracks
Co-Chair "E-School - Building a Community of Learners" Conference, 1998-2001.
Pacific Telecommunications Conference (PTC) Conference Chair for Distance Learning Strand, 2000.
PTC '99 Broadening Access to Information Conference Distance Learning Strand Chairman, 1999.
PTC International Conference - coordinated DOE strand of 8 papers on "Forging New Links-Developing Virtual Learning Environments," 1994.

Board of Directors and Chairmanship
Tech Corps Hawaii Board of Directors, 1996 to present
Editorial Board of the PacificNet News Magazine, 1997-present
Hawaii Telecommunications Association Board; Technology and Learning Email Advisory Board Member for SchoolTech Conference sponsored by Technology and Learning Magazine, 1997-present
Co-Chairman of Educate America Act: Goals 2000 Panel - Technology Support Group that developed the Hawaii State Department of Education Technology Plan, "The Hawaii Connection: An Education Technology Plan," 1995.
Hawaii Telecommunication Association Conference- Chair for DOE Conference strand, 1993, 1995.

Collaborators and Other Affiliations

Dr. Steve Baxendale, PREL; Lynn Bills, Surweb; Dr. Phil Bossert, Ohana Foundation; Dr. Malia Chow, Hawaii Institute of Marine Biology; John Cradler, Educational Support Systems; Ruthmary Cradler, Educational Support Systems; Celeste Fox, KITV and Tech Corps Hawaii; Dr. Gordon Grau, University of Hawaii Sea Grant College; Dr. Violet Harada, University of Hawaii Computer Science, Coy Ison, Surweb; Dr. Stephen Itoga, , University of Hawaii Computer Science; Lincoln Jacobe, PacificNet News; Dr. Dan Suthers, , University of Hawaii Computer Science; Nainoa Thompson, Polynesian Voyaging Society; Elisa Yadao, Polynesian Voyaging Society.

Daniel Derwent Suthers

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Professional Preparation

Undergraduate:
Kansas City Art Institute, Photography and Printmaking, Bachelor of Fine Arts, 1979.

Graduate:
Northern Arizona University, Psychology, (no degree), 1982-1985.
University of Massachusetts, Computer Science, M.S. 1988.
University of Massachusetts, Computer Science, Ph.D, 1993.

Positions Held

1998-present: Assistant Professor, Dept. of Information and Computer Sciences, University of Hawai'i at Manoa.
1995-1998: Adjunct Faculty, Department of Information Science, University of Pittsburgh.
1992-1998: Research Associate, Learning Research and Development Center, University of Pittsburgh.

Publications Most Closely Related to Proposal

Suthers, D. (2000, submitted). Towards a systematic study of representational guidance for collaborative learning discourse. Journal of the Learning Sciences.

Toth, E., Suthers, D., & Lesgold, A. (2000, under review). Mapping to know: The effects of evidence maps and reflective assessment on scientific inquiry skills. Science Education.

Suthers, D. D. (1999, January). Representational support for collaborative inquiry. Proceedings of the 32nd Hawai'i International Conference on the System Sciences (HICSS-32), Maui, Hawai'i. (CD-ROM), Institute of Electrical and Electronics Engineers, Inc. (IEEE). http://lilt.ics.hawaii.edu/lilt/papers/SuthersAIED99.pdf

Suthers, D., Toth, E., and Weiner, A. (1997, December). An integrated approach to implementing collaborative inquiry in the classroom. In Proceedings of the 2nd International Conference on Computer Supported Collaborative Learning (CSCL'97), (272-279). Toronto: University of Toronto.

Suthers, D. & Weiner, A. (1995, October). Groupware for developing critical discussion skills. In John L. Schnase and Edward L. Cunnius, Eds. Proceedings of CSCL '95, the First International Conference on Computer Support for Collaborative Learning, 341-348. Indiana U. Bloomington, IN. Mahwah, NJ: Lawrence Erlbaum Associates. Available: http://www-cscl95.indiana.edu/cscl95/suthers.html

Other Publications

Koedinger, K. R., Suthers, D. D., & Forbus, K. D. (1999). Component-based construction of a science learning space. International Journal of Artificial Intelligence in Education, 10, 292-313.

Roschelle, J., DiGiano, C., Koutlis, M., Repenning, A., Phillips, J., Jackiw, N. & Suthers, D. (1999). Developing education software components. IEEE Computer, 32(9), 50-58.

Paolucci, M., Suthers, D. & Weiner, A. (1996). Automated advice-giving strategies for scientific inquiry. In Intelligent Tutoring Systems: Third International Conference, ITS'96, (372-381). Berlin: Springer-Verlag.

Suthers, D. (1993). Sequencing explanations to enhance communicative functionality. In Proceedings of the 15th Annual Meeting of the Cognitive Science Society, (988-993). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Suthers, D. (1991). A task-appropriate hybrid architecture for explanation. Computational Intelligence, 7 (3).

Synergistic Activities

Award for Collaborative Research
Received the Center for Innovations in Learning Technologies (CILT) "Spotlight" award, Community Tools area, Awarded at the annual American Education Research Association meeting. This was for collaborative research on a CILT seed grant titled "Interoperable Components for Shared Active Representations": Daniel Suthers (U. Hawai'i, PI); Cindy Hmelo (Rutgers University), Patricia Schank (SRI International), Nicholas Jackiw (Keypress), and Bill Sandoval (UCLA) along with many others. Presently I am involved in a related CILT-funded project, "Designing

Knowledge Representations for Learning Epistemic Practices of Science," William A. Sandoval (PI, UCLA), Philip Bell (U. Washington), Elaine Coleman (SRI), Noel Enyedy (Berkeley), Daniel Suthers (U. Hawai'i at Manoa).

Asynchronous Learning Networks

Co-PI on the University of Hawai'i's Asynchronous Learning Networks (ALN) initiative, and departmental lead for development of ALN versions of our B.A. and M.S. degrees. This work is intended to serve an increasingly diverse population of learners, some of whom cannot attend scheduled class meetings due to work constraints, parenthood, or our island geography, as well as to enhance options for on-campus students.

Course Development

These courses were taught as special topics seminars, and will be proposed for inclusion in the regular curriculum.

Software for Learning and Work: Examines the design of software systems that harmonize with how people learn and solve problems as individuals and in groups. Surveys several genres of software for learning and work. Students also engage in semester-long projects to design a learning or work-support system of their own. This course is intended to support rapid integration of recent research results into the curriculum. It was offered at the graduate level in face to face meetings and at the undergraduate level through Asynchronous Learning Networks.

Designing Usable Interfaces: Explores software development methodologies that integrate users into the design process early and often, and utilize explicit models of user roles and tasks which are then used to derive models of the software interface. Students develop and evaluate an interactive application of their own. This course was offered simultaneously though face to face and ALN modes to explore how we can expand our ALN offerings without reducing campus-based courses.

Book Editorship

Coediting "Arguing to Learn: Confronting Cognitions in Computer-Supported Collaborative Learning Environments," Jerry Andriessen, Michael Baker, Daniel Suthers, editors. Computer-Supported Collaborative Learning Series. Series Editor: Pierre Dillenbourg. This book is about the processes by which students and teachers can learn by confronting their cognitions within Computer-Supported Collaborative Learning environments (CSCL, computer-based learning environments that are designed to be used for group work). It focuses on the processes and medium of collaborative learning through argumentation. Publication by Kluwer Academic expected in 2001.

Workshops and Conference Tracks

Co-chair of the Hawai'i International Conference on the System Sciences mini-track on "Roles and Issues of Computational Media in Learning Communities," 2000 and 2001. Workshop Program Chair at the Computer Supported Collaborative Learning (CSCL'2000) conference. Also organized a workshop on "Collaborative Representations: Analyzing Learning Interactions." Participants shared video data of students and teachers using representationally rich collaborative learning environments, and shared techniques for the study of this data by demonstrating their analysis techniques.

Collaborators & Other Affiliations

Collaborators within the past 48 months:

Jerry Andriessen (Utrecht), Michael Baker (CNRS & Université Lumière), Philip Bell (U. Washington), Frank Belz (TRW), Lynn Churchill (U. Montana), Elaine Coleman (SRI), Noel Enyedy (Berkeley), Ken Forbus (Northwestern U.), Violet Harada (U. Hawai'i), Cindy Hmelo (Rutgers), Neil Jacobstein (Teknowledge), Nicholas Jackiw (Keypress), Vicki Kajioka (Hawai'i DOE), Sandra Katz (U. Pittsburgh), Victor Kobayoshi (U. Hawai'i), Ken Koedinger (CMU), Alan Lesgold (U. Pittsburgh), David Luckham (Stanford U.), Jaishree Odin (U. Hawai'i), Massimo Paolucci (CMU), Lauren Resnick (U. Pittsburgh), Jeremy Roschelle (SRI), Steve Ritter (CMU), Bill Sandoval, (UCLA), Patricia Schank (SRI International), David Thomas (Montana State U.), Eva Toth (CMU), Arlene Weiner (formerly U. Pittsburgh), Tom Wheeler (ARMY CECOM), Beverly Woolf (U. Massachusetts).

Graduate and Postdoctoral Advisors:

Dissertation: Victor Lessor, Edwina Rissland, Klaus Schultz (deceased), and Beverly Woolf (University of Massachusetts). As research associate: Alan Lesgold (University of Pittsburgh).

Thesis Advisor and Postgraduate Scholar Sponsor:

Ph.D. Theses in progress: Angeles Constantino (ITESM, Monterrey Mexico), Amy Soller (U. Pittsburgh). Master's Thesis awarded: Bo Yang (University of Hawai'i). Postdoctoral: Christopher Hundhausen (University of Hawai'i).

Other Senior and Professional Staff

The following individuals are expected to serve as funded staff or professional development instructors.

M. Malia Chow

Hawaii Institute of Marine Biology
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Kaneohe, Hawaii 96744

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Professional Preparation

Undergraduate:
University of Washington, Molecular and Cellular Biology, B.S., 1983.

Graduate:
University of Pennsylvania, Biomedical Graduate Studies, Ph.D., 1995.

Honors:
NIH Training Grants in Analyses of Development (1988-1994)
National Science Foundation Fellowship (Summer, 1989)

Postdoctoral Institution:
University of Maryland Biotechnology Institute, Center of Marine Biotechnology. Fish Reproduction and Molecular Endocrinology, 1994-1997.

Positions Held

1997-present: Junior Faculty Researcher, School of Ocean Earth Science Technology, University of Hawaii.

Publications Most Closely Related to Proposal

Chow, M. Malia (1999). Sim Rock Café: Simulations as a Tool for Teaching Critical Thinking: A Web-Based Software Module for Teachers and Students, Grades 5-12. http://library.thinkquest.org/50061

Chow, M.M. (1998). An odyssey in voyaging. Technology and Science Literacy.

Chow, M.M. (1998). Tracking the Wind. CD-ROM and web-based science curriculum software developed in partnership with Bishop Museum and Hawaii Department of Education.

Other Publications

Chow, M.M., Kight, K.E., Gothilf, Y., Alok, D., Stubblefield, J. & Zohar, Y. (1998). Multiple GnRHs present in a teleost species are encoded by separate genes: Analysis of the sbGnRH and cGnRH-II genes from the striped bass, (*Morone saxatilis*). Journal of Molecular Endocrinology, 3: 277-89.

Zohar, Y., Chow, M.M., Gothilf, Y., Kight, K.E., Hassin, S., Elizur, A., Cueto Munoz, J.A., & Kah, O. (1996). Endocrine and molecular aspects of the multiple GnRHs present in perciform fish. Paper presented at the Third International Symposium on Fish Endocrinology, Hokkaido, Japan.

Zohar Y, Mylonas C, Gothilf Y, and Chow MM (1996): Endocrine and molecular approaches to manipulation of finfish spawning. Paper presented at the American Advancement for the Association of Scientists, Baltimore, Maryland.

Gothilf, Y., Chow, M.M., Chen, T., Elizur, A., and Zohar, Y. (1995). Molecular cloning and characterization of a novel gonadotropin-releasing hormone from the gilthead seabream (*Sparus aurata*). Molecular Marine Biology and Biotechnology 4(1), 27-35.

Yeh, H., Chow, M.M., Abrams, W., Fan, J., Foster, J., Mitchell, H., Muenke, M. & Rosenbloom, J. (1994). Structure of the human gene encoding the microfibrillar associated protein, MFAP-1, and localization to chromosome 15q15-Q21. Genomics, 23: 443-449.

Synergistic Activities

E-school Teacher. Development of web-based high school science curriculum with an emphasis on integrating modern science with indigenous knowledge. http://eschool.k12.hi.us 1997- present.

Coordination of a task force to conceptualize and implement an Ocean Learning Center, which will be offering high school educational programs and scientific outreach for the broader community. 1999-present.

Award Winner, Think Quest for Tomorrow's Teachers. National Competition 1999. Creation of a National Gold Award website for teachers which presents the method of simulations as a way to teach specific concepts and relationships and improve skills in critical thinking. http://library.thinkquest.org/50061/

Teacher Training and Professional Development. Organized and Presented "Voyaging and Science" Workshop for Teachers at the Pacific Symposium for High School Science, Bishop Museum, 1999. Conducted professional development workshops for teachers statewide on the use of the Internet and web-based science courses. Co-sponsored by the Hawaii Department of Education, Moanalua Gardens Foundation and Maui High Performance Computing Center

Active participant in the Advancement for the Association for Women in Science (AAWIS) as a mentor exposing young women and girls to careers in science. 1994-present.

Collaborators

Guy Kalukukui, Director of Educational Programs, Bishop Museum, Honolulu, Hawaii
Dr. Bernie Kilonsky, Oceanographer, University of Hawaii
Maura O'Connor, Educator, Moanalua Gardens Foundation
Bill Wiecking, Educational Coordinator, Maui High Performance Computing Center

Graduate Advisor:
Dr. Joel Rosenbloom, Cell and Developmental Biology, University of Pennsylvania, Philadelphia, PA.

Postdoctoral Advisor:
Dr. Yonathan Zohar, Director, Center of Marine Biotechnology, University of Maryland, Baltimore, MD.

Robert Bruce Elliott

Advanced Technology Research
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Web: http://atr.k12.hi.us

Professional Preparation

Undergraduate:
University of Colorado, Sociology (no degree), 1978.
University of Hawaii, Education, B.Ed. 1979-1981.

Graduate:
University of Hawaii, Curriculum and Instruction (no degree), 1981-1988.
City University, Educational Technology, M.Ed. 2000.

Positions Held

2000 to present: Resource Teacher, Advanced Technology Research, Honolulu, Hawaii.
1993-2000: Upper elementary teacher, SCBM Coordinator, Waimalu School, Aiea, Hawaii.
1986-1993: Elementary teacher, Hale Kula School, Wahiawa, Hawaii.
1985-1986: Elementary teacher, Hanalani Schools, Wahiawa, Hawaii.
1981-1984: Elementary teacher, Epiphany School, Honolulu, Hawaii.

Synergistic Activities

Advanced Educational Spectrums: Teacher trainer for the use of assessment software to measure soft skills gains in SCANS using Skill Coach®. This software was adopted by the Aiea Complex for tracking student gains in career preparations training.

Reconstructing curricular content for students with specific learning disablities to comprehend content learning. These files are stored and used at Waimalu Elementary School in Aiea, Hawaii to support social studies instruction in special education and mainstreamed classrooms.

Client Handbook: Pamphlet of common technology-related issues for users at Kapiolani Community College. This resource was designed to minimize the service requests for technical assistance from the Customer Care Center in the Information Media, and Technology Services department. This was a collaborative effort designed through an analysis of a two year period of service requests and the expertise of the trouble-shooting staff.

Collaborators & Other Affiliations

Graduate Advisors.
Thesis: Barbara Braskett (City University), Bert Kimura, Ph.D (Kapiolani Community College), Helen Slaughter (University of Hawaii).

Laura Girardeau

Dept. of Information and Computer Sciences
University of Hawai'i at Manoa
1680 East West Road, POST 305A
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Voice: (808) 956-9639
Fax: (808) 956-3548
Email: girardea@hawaii.edu
Web: http://lilt.ics.hawaii.edu/

Professional Preparation

Undergraduate:
University of Oregon, Anthropology, B.A., 1988, *Magna cum laude*

Graduate:
University of Oregon, Environmental Studies, M.S., 1995

Positions Held

September, 2000-Present: Junior Researcher, HNLC Program and Laboratory for Interactive Learning Technologies, Department of Information and Computer Sciences, University of Hawaii

November, 1999-August, 2000: Research Assistant, HNLC Program and Laboratory for Interactive Learning Technologies, Department of Information and Computer Sciences, University of Hawaii

1999: Environmental Educator for K-6 Students, Mt. Pisgah Arboretum, Eugene, Oregon

1995-1999: Environmental Economics Proposal Editor, ECONorthwest, Eugene, Oregon

1994-1999: Behavioral Research Observer, Oregon Research Institute, Eugene, Oregon

1991-1994: Educational Research Editor, Eugene Research Institute, Eugene, Oregon

1990-1991: Biological Technician, U.S. Forest Service, McKenzie Bridge, Oregon

Collaborators

Graduate Advisors:
Dr. Phillip Young, Professor of Anthropology
Dr. Glenn Love, Professor of English
Alan Dickman, Associate Professor of Biology

Stephen Itoga

Dept. of Information and Computer Sciences
University of Hawai'i at Manoa
1680 East West Road, POST 317A
Honolulu, HI 96822

Voice: (808) 956-3500
Fax: (808) 956-3548
Email: itoga@hawaii.edu

Professional Preparation

Undergraduate:

Cornell University, Engineering Physics, B.S., 1965

Graduate:
Cornell University, Aerospace, M.S., 1966
University of California at Los Angeles, Ph.D., System Science, 1973

Positions Held

1995-Present: Department Chair, Dept. of Information and Computer Sciences, University of Hawaii at Manoa
1992-Present: Professor, Dept. of Information and Computer Sciences, University of Hawaii at Manoa.
1984: Cargo loading expert system for Naval Ocean Systems Center
1981-82: Database system for VLSI test stations, Fairchild Tests Systems
1980: Inertial Upper State program for the space shuttle
1966-1975: Satellite navigation and guidance problems analysis, TRW Defense Systems

Publications

Itoga, Stephen, X. Ke, and Y. Liu. (1997, August). An object-oriented uncertainty retrieval approach for graphical databases. In Proceedings of the 7th International Conference on Human-Computer Interaction, (683-686).

Ke, Xiangdong and S. Itoga (1996). A multimedia retrieval approach for graphical images and animation, manufacturing agility and hybrid automation. In Koubek, R., and W. Karwowski (Eds.), Proceedings of the 5th International Conference on Human Aspects of Advanced Manufacturing, (196-199). IEA Press: Kentucky.

Liu, Ya and S. Itoga (1995). A graphic database query language. In Proceedings of the 1995 Pacific Workshop on Distributed Multimedia Systems, Knowledge Systems Institute, 68-75.

Liu, Ya and S. Itoga (1994). An interface for graphics retrieval. In Tang Rongxi (Ed.), Proceedings of the 4th International Conference on Computer-Aided Drafting, Vol. 1, (123-126). Design and Manufacturing Technology, International Academic Publishers: Beijing.

Liu, Ya and S. Itoga (1994). Indexing and retrieving spatial temporal relations in graphics databases, robotics and Manufacturing. In Jamshidi, M. , Nguyen C., Lumia, R. & J. Yuh (Eds.), Proceedings of the Fifth International Symposium on Robotics and Manufacturing, (613-617). ASME Press Series: NY.

Itoga, S. & J. Yuh (Eds.) (1993, December). Proceedings of ISCA: International Conference on Compute Applications in Industry and Engineering. ISBN: 1-880843-07-2.

Itoga, S. (1992, March). New directions in expert systems research. In Proceedings of the TropSoils Workshop: Phosphorus Decision Support System, (155-161). Texas A & M University: College Station.

Yost, R.S., S. Itoga, Z. Li, C. Colfer, A. Le Istiqlal, P. Kilham, J. Hansen (1992). Expert systems for information transfer about soil and crop management in developing countries. Mann, C. & S. Ruth (Eds.) Expert Systems in Developing Countries: Practices and Promises (pp. 115-126). Westview Press: Boulder, CO.

Itoga, S.Y., Chia, C.L., Yost, R.S., Mau, R.F.L. (1990). PROPA: A papaya management expert system. Knowledge-Based Systems, 3(3), 163-169.

Itoga, S.Y., K. Bridges, L. Frederick, R.I. Uyeda (1989-90). The AI microscope learning environment, Journal of Educational Technology Systems, 18(1), 3-14.

Synergistic Activities

2000-2001: Principal Investigator, Support for the Next Generation Internet Program (USAF)

1997-1998: Principal Investigator, Support for the Radar Modernization Program. (USAF)

1989-1991: Principal Investigator, Expert System Disease Module for Hawaiian Aquaculture. (USDA) (1984-1990)

1984-1990: Co-Principal Investigator, Application of Expert Systems to the Development and Transfer of Soil Management Research. (US/AID)

1985-1992: Summer Program for the Enhancement of Basic Education. Contract with the Hawaii Department of Education

Collaborators & Other Affiliations

Collaborators within past 48 months:

Kim Bridges (UH Manoa); Ghasemi-Nejhad; Ke, X.; Liu, Y.; Sarkar; Sugihara; Xiangdong, Ke; Yamauchi; Yuh, J.

Doctoral Advisor:

Dr. Sheila Greibach, University of California at Los Angeles.

Donna Min Shiroma

Advanced Technology Research
Hawaii Department of Education
3645 Waialae Avenue, B302
Honolulu, HI 96816

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Fax: (808) 733-4730
Email: donna_shiroma@notes.k12.hi.us
Web: http://atr.k12.hi.us

Professional Preparation

Undergraduate:
University of Hawaii, Elementary Education, Bachelor of Education, 1990.

Solano College, CA, Psychology, Associate of Arts, 1974.

Solano College, CA, Early Childhood Education, Associate of Science, 1994.

Graduate:
University of Hawaii, Library & Information Studies, Master's Degree, 1991.

Positions Held

1997-Present: State Resource Teacher, Advanced Technology Research, Hawaii Department of Education.

1992-1997: Librarian, Kapalama Elementary School, Hawaii State Department of Education.

1992-1992: Librarian, Red Hill Elementary School, Hawaii State Department of Education.

Publications

"New Learning Environment", Hawaii's Web & Internet News, March 1999, p. 23.

Synergistic Activities

Course Development

Co-instructor & Course Developer, Technology & Telecommunications for Teachers (T3) Program, 1997 – 2000:

"Learning with Technology & Telecommunications", 1997-98, 1998-99

"Tech Skills & Services", 1999- 2000

Member of Development T3 Team, 2000-2001

Workshops and Conference Tracks

"Click into the Future – Education in the New Millennium", Telecom 2000 (Hawaii Telecommunications Association), September 2000.

"Bridging the Digital Divide", NECC (National Educational Computing Conference), June 2000.

"Internet Basics: Driving on the Information Super Highway", SchoolTech Expo, April 2000.

Collaborators & Other Affiliations

Hawaii Association of School Librarians, President, 1998-99.

Deborah Decker Tisdell

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Professional Preparation

Undergraduate:
University of Montana, Elementary Education, B.A., 1981

Graduate:
University of Montana, State of Hawaii, Non-degree graduate courses, 1981-present
Technology and Telecommunication for Teachers, 15 credits, 1995-96
Plan to begin coursework for MS in Instructional Technology in January 2001

Positions Held

1999-present	State of Hawaii-Advanced Technology Research-Technology Resource Teacher (Professional Development)
1996-1999	State of Hawaii-(Maui district) King Kekaulike Complex Elementary Gifted Talented Resource Teacher/Technology
1995-1996	Princess Nahi'ena'ena Elementary School-(Maui) Curriculum Resource, Reading, New teacher mentor
1992-1995	Princess Nahi'ena'ena Elementary School-(Maui) Kindergarten teacher (grade level chairperson)
1991-1992	Kihei Elementary School-(Maui) Kindergarten teacher
1990-1991	Lolo Middle School-(Lolo, MT) 6th grade math/K-8 manipulative math lab
1988-1990	Lolo Middle School-(Lolo, MT) 6th grade teacher
1984-1988	Lolo Elementary School-(Lolo, MT) Kindergarten teacher
1983-1984	Lolo Elementary School-(Lolo, MT) Transitional K/1 teacher
1981-1983	Lolo Elementary School-(Lolo, MT) First grade teacher

Synergistic Activities

Coordinated training in manipulative mathematics lab K-8 (funded by Exxon grant) to train teachers to teach math concepts using manipulative materials (1990-1991)

Developed program for authentic assessment and narrative progress reporting for Kindergarten students-presented this program at state and local conferences associated with the National Association for the Education of the Young Child (1993-1996)

Developed and taught summer technology training courses funded by Technology Literacy Challenge Fund grant (1997-2000)

Developed and taught Teaching with Technology web-based course designed to train teachers to integrate technology into their curriculum (1999-2000)

Coordinated revision of Technology and Telecommunications for Teachers program (T3) to align with National Professional Technology Standards for Teachers and NCATE endorsement (1999-2000)

Jean T. Tsuda

Advanced Technology Research
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Professional Preparation

Undergraduate:
University of Hawaii, Manoa, Bachelor of Education, 1962

University of Hawaii, Manoa, Professional Diploma (Elementary Education), 1963

Graduate:
University of Hawaii, Manoa, Masters in Educational Administration, 1989

Positions Held

1999-present: Educational Specialist, Advanced Technology Research, Hawaii Department of Education

1998-1999: Interim Deputy District Superintendent, Windward Oahu District, State of Hawaii

1993-1998: Principal, Kahalu'u Elementary School, Kaneohe, Hawaii

Workshops and Conference Tracks

Workforce Development Council Conference, Hawaii State Capitol, Presenter: Magnet E-Academy, August, 2000.

Women in Technology Conference, Maui, Hawaii, Presenter: Magnet E-Academy, January, 2000.

Gifted/Talented Conference, Honolulu, Hawaii, Presenter: Magnet E-Academy, January, 2000.

Planning Committee Member, "Building a Community of Learners" E-School Conference, Hawaii DOE, November, 1999.

Collaborators & Other Affiliations

Delta Kappa Gamma Society International, Beta Beta State, Mu Chapter since 1985

National Association of Secondary School Principals

Graduate and Postdoctoral Advisors:
Dr. Charles Araki, University of Hawaii at Manoa, College of Education

A PROPOSAL

SUBMITTED BY

UNIVERSITY OF HAWAII

TO:	Department of Education
PROJECT TITLE:	"Hawaii Networked Learning Communities"
PRINCIPAL INVESTIGATOR:	Dr. Daniel D. Suthers
DEPARTMENT:	Information and Computer Sciences
PROJECT PERIOD:	May 1, 2001 – April 30, 2007
AMOUNT REQUESTED:	$1,233,732.00

AUTHORIZING UNIVERSITY OFFICIAL: _____ DATE: SEP 28 2000

Marvin S. Enokawa
Director of Research Services

ADDRESS: University of Hawaii
Office of Research Services
Sakamaki D200
2530 Dole Street
Honolulu, HI 96822

Please ensure that all correspondence regarding this application and project is addressed to the Office of Research Services.

Misc - M

SUPT.
DEP.
ASST. C

MHPCC
MAUI HIGH PERFORMANCE COMPUTING CENTER

550 Lipoa Parkway • Kihei, Maui, HI 96753
Phone: (808) 879-5077 • Fax: (808) 879-5018
info@mhpcc.edu • www.mhpcc.edu

DEPT OF EDUCATION
SUPT'S OFFICE
SEP 11 8 5.. AM '00

September 6, 2000
MHPCC 00-GB-012

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info
9/11

Dr. Paul G. LeMahieu
Superintendent of Education
Hawaii Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Dr. LeMahieu,

As one of the many stakeholders interested in systemic educational reform in Hawaii, the Maui High Performance Computing Center (MHPCC) strongly supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HNLC) initiative. This proposal, which targets enhanced science, mathematics, and technology learning for the rural school environment, will catalyze and complement your standards-based educational goals for Hawaii.

MHPCC is a national supercomputing center established by the University of New Mexico through a Cooperative Agreement with the Air Force Research Laboratory. Ranked among the top supercomputing centers in the world, MHPCC provides a wide array of services to its international client base, ranging from high performance computational and storage capability, to expert staff, to wide band connectivity. Our interest in educational initiatives within the state is a direct function of our charter, and has resulted in support to the Hawaii Department of Education since 1994. What began as an initiative to connect schools to the Internet has evolved into a strong partnership with programs that include E-school, high technology consulting services, special interest educational workshops, support for educational servers with access to advanced Internet technologies, and service on the advisory board for Hawaii's Networked Learning Communities.

MHPCC will support the implementation of the HNLC initiative by continuing this partnership with the Hawaii Department of Education. Our goal is continued exploration of methods to bridge the digital divide to make the full capabilities of the Internet accessible to teachers and students in rural areas. MHPCC is committed to providing the following resources and services:

- Development and implementation of cutting edge technologies for schools: Digital Media, Wireless and Distance Learning
- On site assistance with school servers and specialized technology
- Development of innovative educational strategies for use in the classroom
- Internet access for all K-12 schools in Hawaii
- Support for E-school and Magnet E-academy
- Consulting services for DOE staff, including higher end technology and security issues

- Assist HDOE in keeping abreast of new developments and emerging technologies, and their potential for implementation into the HDOE curriculum
- Invitations to special interest educational workshops and briefings
- Development and hosting of DOE special servers: streaming media, applications and databases
- Hosting tours and educational workshops at MHPCC
- Applications Service Provider (ASP) for E-school programs
- Remote hosting of school web sites for classroom use
- Web Services Provider for Technical Help pages
- Host the SuperComputing Challenge
- Development and maintenance of local educational resources on-line such as the Teacher Toolkits
- Support of career day programs and HDOE conferences on all islands

Continued growth of Hawaii's educational curriculum through the Hawaii Networked Learning Communities initiative promises to create a stronger foundation for our community. Emphasis on science, mathematics, and high technology will help shape the future of Hawaii's workforce for the 21st century. We are proud to partner with you, and stand ready to support you in this effort.

Sincerely,

Eugene Bal III
Director

UNIVERSITY OF HAWAI'I AT MĀNOA

Teacher Education and Curriculum Studies
College of Education

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804
September 5, 2000

Dear Superintendent LeMahieu:

As a professor of science education in the Department of Teacher Education and Curriculum Studies (TECS), College of Education, I support the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HLNC). I feel this proposal targeting rural schools for enhanced science, mathematics, and technology learning will enhance the standards-based educational goals of Hawaii.

The proposal will also operate synergistically with professional development efforts developed by faculty in the College of Education and College of Tropical Agriculture and Human Resources. For the past 2 years, the Agriculture-Based Remediation Program (ABRP), funded by the US Departments of Agriculture and Army, has underwritten a 3 credit environmental science course for K-12 teachers: *TECS 433 Interdisciplinary Science Curriculum (Bioremediation)*. Hawaii's unique ecosystem and cultural practices provide the context for a course that is standards-based and focused on bioremediation, restoration and conservation of Hawaii's limited natural resources. *Malama I Ka 'Aina*, Sustainability, is a key science content standard addressed in the course. The UH-DOE-private school team of instructors used the *ahupua'a* as an environmentally and culturally significant conceptual framework to present the interaction of human activities on Hawaii's land and coastal resources.

Because TECS 433 is designed to run through a full calendar year, is project and problem-based, and provides opportunities for teachers to submit proposals for additional ABRP funding for their school programs, several teachers have developed ambitious projects that parallel those exhibited by participants in the HLNC. Four of these teachers are involved in 2 pending grants:

- "Keiki Science 2--A Professional Development Model of Teachers Teaching Teachers", submitted to the Dwight D. Eisenhower Professional Development Program by Pauline W. U. Chinn, UH-Manoa and Susan Kusunoki, Haha'ione School. $30,890 requested.
- *"Malama I Ka Aina* (To Care for the Land)" a proposal submitted by Pauline W. U. Chinn and Traci K. Sylva, UH-Manoa and Gary Glenn, Massachusetts Foundation for Excellence in Marine and Polymer Sciences to the US Department of Education. David Fuertes, Kohala H.S., David Hana'ike, Kawananakoa M.S. and Lillian Yanagawa, Kalani H.S. DOE contributed to this proposal. $1,200,000 over 3 years requested.

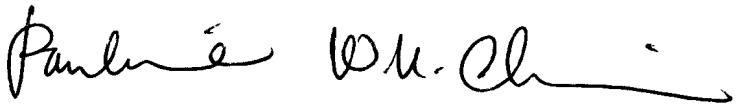
1776 University Avenue, Wist Annex 2, Honolulu, Hawai'i 96822-2463
Facsimile: (808) 956-3918

Contingent on funding, our projects and programs can effectively support the implementation of the HNLC initiative by:

- Providing teachers with relevant content area coursework;
- Extending the HNLC network with the inclusion of TECS 433 teachers and programs;
- Sharing resources and expertise with teachers and schools in the HNLC.

I feel strongly that this project will not only further education in Hawaii but will increase awareness and wiser use of our state's unique resources and accelerate the integration of advanced technologies in our K-12 schools.

Sincerely,



Pauline W. U. Chinn, Assistant Professor

Maui Community College
UNIVERSITY OF HAWAI'I
THE LEARNING CENTER

Maui Community College
310 Kaahumanu Ave.
Kahului, HI 96732

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

September 5, 2000

Dear Superintendent LeMahieu:

As an educational institution interested in systemic educational reform in Hawaii, Maui Community College supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HLNC). We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will enhance the standards-based educational goals of Hawaii.

Maui Community College has several high technology programs such as Electronics and Computer Engineering Technology, PC-Cluster Technology and Media Arts technology that require students with significant basic understanding of mathematical and scientific concepts. The HLNC is a project we expect will assist in providing the aforementioned qualified students.

Maui Community College is willing to assist this initiative by providing new approaches to delivering developmental mathematics such as an on-line Internet-based system now in the planning stages. It is expected that this system will be operation by 2002.

I feel that this project will not only further education in Hawaii but will increase both awareness and use of our State's unique resources with the integration of advanced technologies in our K-12 schools.

Sincerely,

G. Robert Converse
Special Assistant to the Dean of Instruction
Project Director, NSF
Director, Title III
Director, The Learning Center

UNIVERSITY OF HAWAI'I AT MĀNOA

College of Business Administration
Asia-Pacific Center for Entrepreneurship and E-Business

September 1, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Superintendent LeMahieu:

As one of the stakeholders interested in systemic educational reform in Hawaii, the Asia-Pacific Center for Entrepreneurship and E-Business supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HNLC). We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will enhance the standards-based educational goals of Hawaii.

The vision of the Asia-Pacific Center for Entrepreneurship and E-Business is to rekindle the spirit of entrepreneurship in Hawaii. A well-educated population has long been recognized as a key ingredient for economic development and prosperity for the future. Higher education is even more essential in the New Economy, which is driven by global competition and high-technology industries. Jobs that require a college degree are growing twice as fast as others, and the 20 occupations with the highest earnings all require at least a bachelor's degree.

The Asia-Pacific Center for Entrepreneurship and E-Business can effectively support the implementation of the HNLC initiative by:

- Creating greater awareness of the entrepreneurial opportunities in hi-tech fields, and the importance of learning science, math and technology to take advantage of these opportunities;
- Encouraging our students to serve as mentors to K-12 students involved in HNLC programs;
- Collaborating on outreach initiatives between HNLC and the Center for Entrepreneurship and E-Business.

I strongly support the HNLC project because it will not only further education in Hawaii but will increase both awareness and use of our state's unique resources and the integration of advanced technologies in our K-12 schools.

Sincerely,

Shirley J. Daniel
Interim Director
Asia-Pacific Center for Entrepreneurship and E-Business

2404 Maile Way, Honolulu, Hawai'i 96822
Telephone: (808) 956-7564, Facsimile: (808) 956-9685

http://www.cba.hawaii.edu

TECH CORPS HAWAII

September 6, 2000

Dr. Paul G. LeMahieu
Superintendent of Education
Hawai'i Department of Education
P.O. Box 2360
Honolulu, Hawai'i 96804

Dear Dr. LeMahieu,

As a member of the grant development and implementation team, Tech Corps Hawaii supports the Rural Systemic Initiatives in Science, Mathematics, and technology education. We are committed to the ideas outlined in the implementation proposal.

Tech Corps Hawaii is an organization of volunteers whose mission is to ensure that all students in Hawai`i have the opportunity to use the tools of advanced communication technology to further their education. We share with the Hawai`i State Department of Education the goal of providing the highest quality courses by networking students and educators in communities large and small.

It has been our sincere pleasure to work with Diana Oshiro and Vicki Kajioka since Tech Corps Hawai`i's inception in 1996. Their visionary approach to education has always shown the deepest respect for students and their families and a personal commitment to using advanced technology to enhance Hawai`i's future.

During the developmental phase of the project, we worked as part of the team to shape the vision and mission. We are pleased to continue our support and to expand our participation throughout the implementation phase. Our support will include facilitating the use of volunteers in the schools to assist students, teachers and administrators. We will also move to bring the business community into the process; to provide technical support and to showcase the superb work and abilities of Hawai`i's students.

We feel strongly that this project will not only further education in Hawai'i but will increase both awareness and utilization of our state's unique resources and the use of advanced technologies. It will help to create a networked learning community that emphasizes collaboration and commitment in order to develop those skills our students will need in the 21st century.

We look forward to supporting this initiative and sharing our expertise with learners statewide and across the nation.

Sincerely,

Celeste Fox
Tech Corps Hawaii
Board President

Island Television
KITV4
hawaii
A Hearst-Argyle Television Station

September 7, 2000

Dr. Paul G. LeMahieu
Superintendent of Education
Hawai'i Department of Education
P.O. Box 2360
Honolulu, Hawai'i 96804

Dear Dr. LeMahieu,

As part of the community of stakeholders interested in systemic educational reform in Hawai'i, KITV4 supports the Rural Systemic Initiatives implementation proposal for the Hawai'i Networked Learning Communities initiative. We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will catalyze and complement the standards-based educational goals of Hawai'i.

KITV4 is the ABC Network affiliate in Hawai'i and the first all digital station in the nation. We are proud of our long history of service to Hawai'i's communities through environmental, cultural and educational projects. We are especially pleased to have had the opportunity to collaborate with the Hawai'i State Department of Education on projects like E-School, E-Academy, E-Charter, Hokule'a's Voyage to Rapa Nui, Internet training videos and several public service announcements.

KITV4 can effectively support the implementation of the HNLC initiative by continuing to provide production facilities and airtime support for public service announcements and other video projects that can be used to inform the public and enhance the course work. As digital broadcast technology develops we envision our partnership growing and enriching the educational experience for students and families throughout the islands.

Although the focus is on rural schools, we realize that the HNLC initiative is a part of statewide efforts to improve science, mathematics, and technology education in all the schools of Hawai'i. We relish the opportunity to be a part of this exciting implementation of authentic, networked learning that utilizes the unique resources of our island geography and culture.

Sincerely,

Celeste Fox
Director of Public Affairs
Web Manager / Web Designer

One Archer Lane, 801 S. King St., Honolulu, HI 96813
Phone: (808) 535-0400 Main Fax: (808)536-8777 News Fax: (808) 536-8993 http://www.kitv.com

UNIVERSITY OF HAWAI'I

Sea Grant College Program
School of Ocean and Earth Science and Technology

September 28, 2000

Dr. Paul G. LeMahieu
Superintendent of Education
Hawai'i Department of Education
P.O. Box 2360
Honolulu, Hawai'i 96804

Dear Dr. LeMahieu,

The University of Hawai'i Sea Grant College Program of the School of Ocean and Earth Science and Technology supports an innovative program of research, education and outreach activities that are directed to the improved understanding, management and use of marine resources of the state, region and the nation. Our research involves all aspects of pure and applied science in tropical and subtropical marine life. The School of Ocean and Earth Science and Technology has state-of-the-art laboratories and equipment, a fleet of research ships and boats, and a staff of internationally-recognized faculty performing influential research. Our capability for studying tropical marine biology is not duplicated anywhere else in the world.

We have a strong interest in encouraging the learning of science by Hawaii's school children and in connecting the educational resources of the University to K-12 education. We have an extremely successful program of field trips for children and adults, and we offer the opportunity for hands-on applications of science to groups of volunteer students from local high schools. We recognize the continuous need to make science clear and interesting to everyone, and to encourage those with an aptitude in it to obtain all the education in this field that they can use. Obviously, we support with enthusiasm the Rural Systemic Initiatives in Science, Mathematics, and Technology Education. We are committed to the ideas outlined in the implementation proposal.

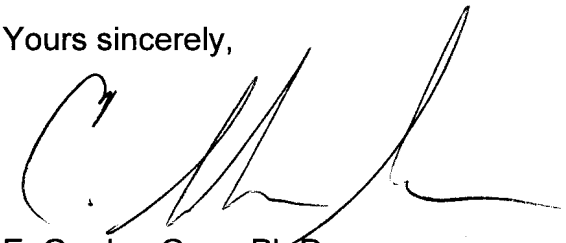
As a member of the grant development and implementation team, the University of Hawai'i Sea Grant College Program will provide support for this initiative. Our organization is committed to the activities described in the application. We are enthusiastic about the opportunity to collaborate with State Department of Education and Tech Corps Hawai'i. Our support will include advice, field trips to Coconut Island, encouragement of student participation in research and in the activities of the School of

2525 Correa Road, Room 238 • Honolulu, Hawai'i 96822-2336 • Telephone: (808) 956-7031 • Facsimile: (808) 956-3014

Ocean and Earth Science and Technology, mentoring of beginning and more advanced students in ocean sciences, and helping with the development of science projects.

We recognize that this project is important to the entire community's effort to improve education, especially in rural areas that so frequently suffer from the lack of trained teachers and advisors. In addition, we expect the influence of this initiative to attract wide interest on the part of other rural communities that face the same scarcity of trained professional people to teach their children. We are certain that projects of this sort are in the forefront of the development of modern science teaching, and understandably, we are completely supportive of this excellent proposal.

Yours sincerely,



E. Gordon Grau, Ph.D.
Director

University of Hawai'i at Mānoa

Colleges of Arts and Sciences
College of Natural Sciences
Bilger Hall 102 • 2545 The Mall • Honolulu, Hawai'i 96822
Telephone: (808) 956-6451 • Facsimile: (808) 956-9111

Office of the Dean

September 25, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Superintendent LeMahieu:

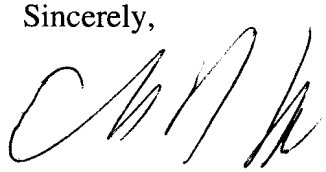
As key stakeholders in the Hawaii Networked Learning Communities project, funded by a NSF Rural Systemic Initiative development grant, we fully support educational reform in Hawaii. We believe that this implementation grant proposal, which targets K-12 rural schools for enhanced science, mathematics, and technology learning, will catalyze and complement the standards-based educational goals in Hawaii.

Faculty members in the Department of Information and Computer Sciences have provided important leadership to this HNLC effort. Professors Dan Suthers and Violet Harada have been two of the principal investigators in this partnership initiative with the Hawaii Department of Education. ICS Department Chair Stephen Itoga has also participated in the development team's activities. In addition, other members of the College of Natural Sciences have served on the HLNC Advisory Committee.

The College will continue to support the implementation of the HNLC initiative by (1) assisting with the design and teaching of computer science courses for in-service teachers, (2) establishing an on-line database of exemplary science and math curriculum projects and resources, and (3) continuing to provide collaborative leadership as principal investigators.

We are excited about being major contributors to this networked learning project that capitalizes on the unique resources of our island geography and culture. We feel strongly that this initiative will not only further education in Hawaii but will increase both awareness and use of advanced technologies for deeper teaching and learning in our schools.

Sincerely,



Chuck Hayes
Interim Dean

College of Education
Department of Educational Technology
1776 University Avenue • Wist Hall 232
Honolulu, HI 96822-2463

August 30, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Superintendent LeMahieu:

As one of the stakeholders interested in systemic educational reform in Hawaii, the PT3 LEI Aloha Project supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HLNC). We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will enhance the standards-based educational goals of Hawaii.

The LEI Aloha: Learning Enhancement through Innovations project is funded through the US DOE's Preparing Tomorrow's Teachers to Use Technology grant. The goal of LEI Aloha is to prepare future teachers to design and implement effective learning activities that use technology as a tool. This year, we will be focusing on working with mentor teachers who are part of the College of Education cohort schools, to enhance the student teaching experience with technology. Our project also partners with rural schools in the State such as the Molokai School Complex and elementary schools on the Waianae coast. Holomua Elementary School in the Leeward District is a consortium partner with our grant.

Our organization can effectively support the implementation of the HNLC initiative by collaborating on professional development activities for preservice and inservice teachers such as workshops, seminars, online training, and outreach courses; sharing technology and curriculum resources developed by grant activities, and providing equipment for school-based training.

We feel strongly that this project will not only further education in Hawaii but will increase both awareness and use of our states unique resources and the integration of advanced technologies in our K-12 schools.

Sincerely,

Curtis P. Ho, Ph.D.
Project Director

Voice: (808) 956-7771 Fax: (808) 956-3905 Email: curtis@hawaii.edu

UNIVERSITY OF HAWAI'I ❖ KAPI'OLANI COMMUNITY COLLEGE

INFORMATION, MEDIA & TECHNOLOGY SERVICES
4303 DIAMOND HEAD ROAD • HONOLULU, HI • 96816
☎ (808) 734-9841 • FAX (808) 734-9287

September 13, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Dr. LeMahieu:

Kapi'olani Community College's Information Media and Technology Services department supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HLNC). We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will contribute to systemic educational reform and enhance the standards-based educational goals of Hawaii.

Over the past two years, Kapi'olani CC restructured it's campus organizational structure in order to be more responsive to educational needs in Hawaii and to focus more on learner outcomes. Consolidation of technical support and technical knowledge was one result of this change. Our department's mission is to enable faculty to excel in instructional development and students to succeed in learning through the application of technology.

Our department can support implementation of the HNLC initiative by providing staff expertise, knowledge and skills in educational technology applications, identifying mentors or resource people from this campus or participate in an advisory role during project implementation.

We feel strongly that this project will further education in Hawaii and increase both awareness and use of Hawaii's unique resources and the integration of advanced technologies in our K-12 schools.

Warmest regards,

Bert Y. Kimura
Professor & Coordinator

HTDC HIGH TECHNOLOGY DEVELOPMENT CORPORATION

September 14, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawaii Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Superintendent LeMahieu:

As one of the stakeholders interested in systemic educational reform in Hawaii, the High Technology Development Corporation, an agency of the State of Hawaii, supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HLNC). We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will enhance the standards-based educational goals of Hawaii.

Our agency's broad mission is to facilitate the growth of the high technology industry in Hawaii. One of our projects is the Manoa Innovation Center, a 50,000 square foot facility, in which technology entrepreneurs can start successful businesses. We are happy to report that the number of technology companies has quadrupled over the last decade. However, this growth has greatly increased the demand for a locally accessible, qualified workforce. Many of our technology companies have stated that they cannot find enough local talent, and are hiring from out of state. To address this demand issue, technology education with emphasis in math and science will help prepare our grade school children to be the competitive technology workers of tomorrow.

HTDC can effectively support the implementation of the HNLC initiative by helping to provide an interface between students and the workforce needs of technology companies. For example, we can facilitate student internships with high-tech start-ups, assist coordination of technology presentations at schools by entrepreneurs (emphasizing the need to do well in math and science), and arrange for students to take on-site tours of the Manoa Innovation Center.

We feel strongly that this project will not only further education in Hawaii but will increase both awareness and use of our states unique resources and the integration of advanced technologies in our K-12 schools.

Sincerely,

Nola N. Miyasaki
Acting Executive Director & CEO

2800 WOODLAWN DRIVE
SUITE 100
HONOLULU, HI 96822
PHONE: 808 539-3806
FAX: 808 539-3611
http://www.htdc.org

University of Hawai'i at Manoa

Dale Myers
Department of Mathematics
2565 The Mall • Honolulu, Hawaii 96822-2273
Phone: (808) 956-4672 • Fax: (808) 956-9139 • Email: dale@math.hawaii.edu

September 16, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawai'i Department of Education
P. O. Box 2360
Honolulu, HI 96804

Dear Dr. LeMahieu,

The Mathematics Department of the University of Hawaii supports the Rural Systemic Initiatives in Science, Mathematics, and Technology Education. Implementing these initiatives will certainly improve the educational opportunities for rural and neighbor island students interested in math and science. These students have consistently been underrepresented in our math courses at UH relative to students from affluent urban neighborhoods of O'ahu. We feel that the networked learning and standards-based curricula proposals of this initiative can alleviate this problem.

The UH Mathematics Department provides much of the teacher training for secondary math instructors. Hence we can play an essential roll in introducing new educational technologies. We are also interested in providing continuing education for high school teachers in the form of summer workshops (here at UH or on neighbor islands). These could be intensive two week courses for graduate credit.

The content, including lectures, of several of our lower-division courses are available online. These courses can easily be extended to be part of the networked learning community proposed in this initiative. Advanced-placement students have consistently done well in our calculus courses. The proposed initiative will help make the advanced courses available to a larger number of secondary students. More importantly, we need to improve the success rate of the majority of high school students who require calculus. A large proportion fails our placement exam. In this area, the proposed initiatives are urgently needed.

Here at UH we have a decade of experience with our computer-based calculus lab which is a required part of our calculus sequence. The material for this innovative course was developed entirely in Hawaii. We are initiating a similar program for a computer-based interactive precalculus course. We hope to make this precalculus course available to high schools. The course materials, including video, animation and interaction (see `http://www.math.hawaii.edu/~dale/flash/square.html` for a sample lecture) will be on a CDROM while student/teacher interaction will be both traditional and online. High students who complete the course would able to enroll directly in the UH calculus sequence.

Dale Myers
Associate Professor
Mathematics Department
University of Hawaii

SIMON FRASER UNIVERSITY

FACULTY OF EDUCATION

BURNABY, BRITISH COLUMBIA V5A 1S6
Telephone: (604) 291-3395

September 21, 2000

Dr. Paul G. LeMahieu
Superintendent, Hawai'i Department of Education
P. O. Box 2360
Honolulu, HI 96804

Dear Dr. LeMahieu,

I am writing to express my support for the Rural Systemic Initiative being proposed by the Hawai'i Department of Education and the University of Hawai'i. I believe the project will present a unique opportunity to strengthen standards-based education in Hawai'i, through the application of recent research in Computer-Supported Collaborative Learning and by leveraging the unique resources of Hawai'i's geography and scientific research institutions.

I look forward to engaging in the networked learning community you build. The island geography of Hawai'i makes it an excellent locale for a such a community, and its wealth of scientific expertise and research infrastructure make you well situated to recruit a pool of volunteer scientists who can commit small amounts of time on a regular basis to guide students pursuing ambitious classroom inquiry.

I have been carrying out applied research on on-line mentoring (or "telementoring") relationships since 1994, when I was a graduate student on the NSF-funded CoVis Project at Northwestern University. In the intervening years, under funding from the James S. McDonnell Foundation and Canadian agencies, I have worked closely with middle and high school science teachers and hundreds of volunteer scientists to plan, carry out and evaluate the learning benefits of telementoring relationships for small teams of science students. My most recent research in this arena took place in collaboration with Marlene Scardamalia and the CSILE/Knowledge Forum team at the University of Toronto. As my published reports of this work have shown, the potential of such relationships for supporting reform-oriented pedagogy and improving scientific literacy are strong.

I look forward to lending my support and advice as you plan, implement, and assess the learning benefits of telementoring relationships for the K-12 students involved in the Hawai'i Networked Learning Community. I wish you success in your pursuit of funding.

Sincerely,

D. Kevin O'Neill
Assistant Professor
Faculty of Education
Simon Fraser University

University of Hawai'i at Manoa

Hawai'i Space Grant Consortium
Hawai'i Institute of Geophysics and Planetology
School of Ocean and Earth Sciences and Technology
2525 Correa Road, Honolulu, HI 96822
Telephone (808) 956-3899 FAX (808) 956-6322
gjtaylor@pgd.hawaii.edu; www.pgd.hawaii.edu/~gjtaylor

September 13, 2000

Dr. Paul G. LeMahieu
Superintendent of Education
Hawai'i Department of Education
P.O. Box 2360
Honolulu, Hawai'i 96804

Dear Dr. LeMahieu,

As part of the community of stakeholders interested in systemic educational reform in Hawai'i, the Hawai'i Space Grant Consortium supports the Rural Systemic Initiatives implementation proposal for the Hawai'i Networked Learning Communities initiative. We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will catalyze and complement the standards-based educational goals of Hawai'i.

The Hawai'i Space Grant Consortium conducts teacher-training workshops and has developed courses for undergraduates in subjects pertinent to HNLC. In particular, we focus on the use of remote sensing combined with GIS and GPS. These ongoing programs will be available to teachers working with the HNLC initiative. We can help support implementation of the initiative by insuring that our programs will be available to your teachers. We can also provide some guidance in the use of remote sensing images and the synergy among remote sensing, GIS, and GPS.

Although the focus is on rural schools, we realize that the HNLC initiative is a part of statewide efforts to improve science, mathematics, and technology education in all the schools of Hawai'i. We relish the opportunity to be a part of this exciting implementation of authentic, networked learning that uses the unique resources of our island geography and culture.

Sincerely,

G. Jeffrey Taylor
Director, Hawai'i Space Grant Consortium

Misc - P

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DEPT OF EDUCATION
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September 5, 2000

Dr. Paul G. LeMahieu
Superintendent of Education
Hawai`i Department of Education
P.O. Box 2360
Honolulu, Hawai`i 96804

Dear Dr. LeMahieu,

Aloha. As part of the community of stakeholders committed to systemic educational reform in Hawai`i, the Polynesian Voyaging Society supports the Rural Systemic Initiatives implementation proposal for the Hawai`i Networked Learning Communities initiative. We strongly believe this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will catalyze and complement the standards-based educational goals of Hawai`i.

As you know, the Polynesian Voyaging Society is a strong proponent of educational programs which are relevant, effective and lead students to destinations which allow them to be productive and fulfill their potential. We have been long-time partners with many of the principals who will be associated with the HNLC initiative and have the utmost confidence that this new program will yield the same positive results as past endeavors.

With the program's emphasis on science, mathematics and technology learning, we are hopeful that students who participate in the Rural Systemic Initiatives program will be a part of Hokule`a's statewide sail. We have already begun planning for their involvement and believe that the academic training in this program will provide a strong foundation for students to then participate in some sort of voyaging experience or program.

POLYNESIAN VOYAGING SOCIETY
Ala Moana Blvd., Pier 7 Honolulu, Hawai'i 96813
Phone: 808-536-8405 Fax: 808-536-1519
http://leahi.kcc.hawaii.edu/org/pvs

The Polynesian Voyaging Society is excited about once again being able to partner in an educational program which links science, culture and learning, a core function of this proposal.

As a side note, we commend the effort to begin this program within rural schools, where needs are especially compelling. We look forward to the time when the HNLC initiative is part of a statewide effort to improve science, mathematics and technology education in all the schools of Hawai`i.

We are enthusiastic and willing partners in this effort and urge your favorable consideration of the Rural Systems Initiatives proposal.

Please feel free to contact either of us if you have any questions, concerns or require additional information.

Aloha,

Elisa Yadao
Executive Director

Nainoa Thompson
Program Director

UNIVERSITY OF HAWAI'I AT MĀNOA

Curriculum Research & Development Group
(Including University Laboratory School)

September 20, 2000

Dr. Paul G. LeMahieu, Superintendent
Hawai'i Department of Education
P. O. Box 2360
Honolulu, HI 96804

Dear Dr. LeMahieu,

The Curriculum Research & Development Group (CRDG) at the University of Hawai'i most strongly supports your application for a National Science Foundation grant under the title Hawai'i Networked Learning Communities. Of particular importance is the your proposed activities target rural schools to enhance science, mathematics, and technology learning, which complements and extends our own areas of expertise and interests. CRDG has a long history of collaboration with the Department of Education in supporting curriculum innovation and sustained professional development for teachers, but as you know, outreach to the rural areas of our state are often difficult, costly and beyond the reach of existing resources. The following describes the resources available through the CRDG and specific ways that our work can support the proposed project in the areas of effective standards-based mathematics and science programs, professional development support for teachers and administrators, and sustained follow-up supporting standards implementation.

CRDG Mission

As an organized research unit of the University of Hawai'i, CRDG's mission is creating, evaluating, disseminating, and supporting quality educational programs for all students and teachers kindergarten through grade 12. Toward this end, CRDG composes teams of teacher-researchers, scholars, evaluators, editors, publication specialists, and teacher trainers who work collaboratively with public and private school systems, universities, and other educational agencies to

- create theories of knowledge, instruction, curriculum design, teacher professional development, school change, and evaluation;
- design, develop, and evaluate curricula based on these theories;
- provide support to teachers using its programs, including consultation, staff development, implementation, and evaluation services;
- contribute to graduate teaching and research in colleges of the university, primarily in the College of Education.

CRDG has a permanent, seasoned staff of about 80, plus a number of associated, part-time scholars. It has curriculum development projects in science, mathematics, English, Pacific and Asian studies, marine studies, environmental studies, Hawai'ian and Polynesian studies, Japanese language and culture, music, nutrition, art, drama, technology, health, and computer education. Research and school-service projects focus on educational evaluation, teacher development, reduction of in-school segregation of students, and programs for students educationally at risk. The six members of the CRDG staff with appointments in the Graduate Faculty of the University serve graduate students in doctoral, masters, and teacher preparation programs. The University supports the CRDG with 50 permanent university appointments.

1776 University Avenue, Castle Memorial Hall Room 118, Honolulu, Hawai'i 96822
Call Toll-Free: 1-800-799-8111, Telephone: (808) 956-4951, Facsimile: (808) 956-6730, http://www.hawaii.edu/crdg

Example Collaborations

The CRDG is the senior member of a consortium of 14 universities in the United States to improve schooling in science, health, and technology in elementary schools; a founding member of the Pacific Circle Consortium of universities, major school systems, and educational ministries in Australia, Canada, Japan, New Zealand, the United States, Mexico, and Korea; and a partner in the Pacific Mathematics and Science Regional Consortium along with the Pacific Resources for Education and Learning (PREL) and the departments of education of the U.S. associated entitites in the Pacific.

CRDG-developed programs are being used experimentally in other countries, including Australia, Israel, New Zealand, Russia, and Slovakia. The CRDG has drawn upon over 400 scholars from relevant university fields. Its publications division distributes over 600 titles.

University Laboratory School

The University Laboratory School, with its diverse student population reflective of the state population (by ability, family income, and ethnicity) is an integral part of the CRDG. The school serves as an experimental setting in which to initiate, develop, test, and demonstrate innovative educational ideas and programs. The Laboratory School shares with CRDG a common mission, site, staff, and commitment to improving education through an interrelated systemic approach that includes effective curricula, professional development for teachers, long-term implementation support, and documentation of results. The school serves as an incubator of new ideas, as a laboratory for the research and development functions, and a demonstration site for the mature programs developed through the CRDG/Laboratory School joint efforts. Daily interactions with students and families in a school context are an essential source of questions, criticisms, ideas, and hypotheses.

Science, Mathematics, and Technology Programs

The CRDG/ULS has completed a K–9 standards-based inquiry science curriculum that is being implemented in schools in Hawai'i nationwide (over 6,500 schools in 40 states). *Developmental Approaches in Science, Health and Technology* (DASH) for elementary schools, *Foundational Approaches in Science Teaching* (FAST) for middle schools, and *Hawai'i Marine Science Studies* (HMSS) for high schools are aligned with both the National Science Education Standards (NRC, 1996) and the HCPS (1999). The mathematics section has completed *Algebra I: A Process Approach* and is nearing completion of an inquiry-based middle-school mathematics program. Development of *DASH*, *FAST*, and *Algebra I* was partially funded by NSF.

These science and mathematics programs were identified by the U.S. Department of Education's Laboratory Network Program as meeting the national standards for science education. *DASH* and *FAST* were validated as exemplary science programs in achieving improved student learning by the Program Effectiveness Panel (PEP) of the U.S. DOE (1994). DASH, FAST, and Algebra I are identified as research-based, effective science reform models in the U.S. DOE's *Catalog of School Reform Models* (NWREL, 1998; 2000). *DASH*, *FAST*, and *Algebra I* have been included in feature articles in the Eisenhower National Clearinghouse *In Focus* publication. *DASH* and *FAST* are identified as exemplary by the Expert Panel on Mathematics and Science Education.

CRDG's mathematics and science programs have well-developed professional development components that achieve results in student and teacher learning (Young, et. al., 1999). *FAST* and *Algebra I* were validated as effective teacher development programs for improving student learning in the National Staff Development Council's *What Works in the Middle: Results-Based Staff Development* (1999) which states, Algebra I *is a combined curriculum and staff development effort. The use of the teacher resources, student texts, and assessments, coupled with the intensive staff development program, have led to significant improvement in student achievement in mathematics with students of diverse backgrounds.* (p. 76)

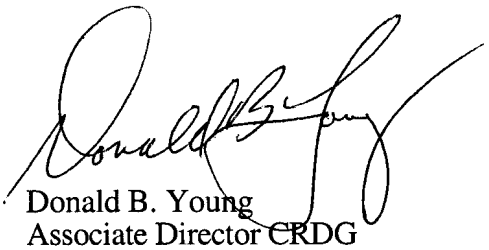
The Eisenhower National Clearinghouse publication *Ideas that Work Science Professional Development* concludes, *FAST is both a curriculum aligned with national science standards and a staff development program. The total program facilitates teachers' implementation of constructivist learning strategies within a well-defined curriculum. It serves as a model of the extensive training and ongoing support needed to provide teachers with the knowledge, skills, and confidence to make dramatic changes in their instructional practice.* (p 59)

Other efforts at improving mathematics, science, and technology education include

- Technology Innovation and Teacher Education Collaborative (TITEC) involves the CRDG, Mississippi State University, and Indiana University of Pennsylvania in a project funded by the Department of Defense to develop and disseminate new and improved uses of instructional technology and provide training for teachers in their use. Of particular note are the School Web of Instructional Media (SWIM) and the professional development components using ADL technology. Results of TITEC will be available to the center.
- Pacific Mathematics and Science Regional Consortium funded by the U.S. Department of Education's Eisenhower program is a joint effort of the CRDG and the Pacific Resources for Education and Learning (PREL) that supports improvement in mathematics and science instruction in the Pacific region. The consortium has collaboratively developed standards for content, teaching, assessment, and professional development appropriate for the diversity of environments, cultures, and languages of the region. Three efforts are particularly relevant to the proposed project. The Pacific Algebra Network uses a team from the Hawai'i Public Television station to videotape the innovative Algebra classes at University Laboratory School and uses the tapes as the basis for professional development of mathematics teachers in the region. The Island Science Series is a set of teacher and student materials for grades 1–5 adapted from our DASH program and used in the Pacific Islands.
- Using Hawai'i's Unique Biota in Biology Education is an NSF-funded project involving graduate fellows in ecology, evolution, and conservation biology working with educators in K–12 schools. Conducted jointly by the CRDG and the Center for Ecology, Evolution, and Conservation Biology, the project serves as a prototype for similar efforts that could be used in the proposed project.
- Developing Effective Leadership Team Activities (DELTA) is an NSF-funded teacher enhancement project targeting faculty in higher education, public and private school mathematics teachers in grades 4–8, and mathematics curriculum specialists from the Pacific Islands. A joint project of PREL and the CRDG, this effort shows great promise of impact and will be analyzed closely for possible applications in distance learning environments.

We look forward to the challenges of creating and supporting the Hawai'i Networked Learning Communities. We anticipate developing the resources to create permanent community, one that will continue after the grant funds are no longer available.

Respectfully,



Donald B. Young
Associate Director CRDG

Hawai'i Institute for Educational Partnerships

1776 University Avenue, UES 103 • Honolulu, HI 96822 • (808) 956-5078 • FAX (808) 956-5665

September 10, 2000

Dear Superintendent LeMahieu:

As one of the interested and active stakeholders in systemic educational reform in Hawaii, the Hawaii Institute for Educational Partnerships (HIEP) supports the Rural Systemic Initiatives implementation proposal for the Hawaii Networked Learning Communities (HLNC). We feel that this proposal, which targets rural schools for enhanced science, mathematics, and technology learning, will support the standards-based educational efforts currently underway in our state.

HIEP has a history of over 15 years of supporting the simultaneous renewal of schools and teacher education with the ultimate goal being the improved learning of the all of Hawaii students. Our organization can effectively support the implementation of the HNLC initiative by bringing together the people and resources of our partners institutions. We have strong connections to the College of Education, the Colleges of Arts and Sciences, and the Hawaii Department of Education. We have access to the leaders and the content area specialist of our partner institutions. We also have strong connections to classroom teachers and school administrators across the state. As in past efforts, we will continue to serve as an organization that brings resources together to achieve common goals.

We feel strongly that it is important to increase both awareness and use of our states unique resources and the integration of advanced technologies in our K-12 schools, and that the HNLC project has great potential in accomplishing this. It is without hesitation that we offer our support and cooperation to the HLNC initiative.

Sincerely,

Joseph Zilliox

Joseph Zilliox
Director