Vortex Based Mathematics Pilot Teaching

State of Hawaii Proposed Marko Rodin Vortex Based Mathematics Pilot Teaching Curriculum Development 5-Year Project Plan

MARKO RODIN FUTURISTIC STEM PILOT AND DISSEMINATION PROJECT – CHARTER SCHOOLS

PROJECT RATIONALE

For the past decade, and with the advent of No Child Left Behind and subsequent focus on high-stakes testing, American children have been held in the cages of an old, tired, and inconsequential curriculum designed for yesterday´s requirements. The recent publication of Tough Choices or Tough Times, a report of the NCEE (National Center on Education and the Economy), confirms that American schools are not adequate for the challenges that lie ahead for today´s children and youth. This is further evidenced by the absurdly low number of America´s high school graduates who choose to enter universities and technical schools to major in engineering, mathematics, science, or technology. Indeed, this indicates an urgent challenge to educators who share a passion for the future of our children and also our country. Failure to recognize the need to dramatically change the curriculum, the way schools, teachers, and students are organized and challenged, poses serious national defense, economic, and security problems for the United States.

PROJECT OVERVIEW

We propose a dramatically different, futuristic approach to learning and in particular learning mathematics, science, and technology for students in two Hawaiian charter schools. The demographics of the children who attend these schools is quite different. One, Kua 'o Ka La, on the Big Island works with children of Hawaiian or Part-Hawaiian ethnicity, and is a Title I school, meaning it serves children from working families who qualify for free/reduced lunch. Kua 'o Ka La enrolls youth from grades 6-11. The second school, Voyager (K-8) is located on Oahu, in the Kaka ëaka district of Honolulu. They educate children of more than ethnic and racial groups, of which only 6% are Hawaiian and 29% are part-Hawaiian. Twenty-six percent of Voyager´s students qualify for free/reduced lunch.

We have chosen these two schools because they both adhere to the multi-age grouping of children, based on skill levels. Further, we believe that the diversity represented by these two schools will allow us to engage in action research and demonstrate excellent results in two very different environments and student populations. This will enhance the project´s influence and allow more educators, including those from Department of Education schools, to see the value of ëdoing things differently.´ Kua ëo Ka La and Voyager will serve as model demonstration schools for Hawaii and the rest of the United States. We anticipate that the federal and state governments and many foundations will look at these schools as beacons of excellence. It is our intention to push the national conversation beyond NCLB, realizing that the standards should be recognized as the floor and not the ceiling for excellence that will be required of our youth in the future.

Until last year, Hawaii charter schools received no funding for facilities. The 2006-07 academic year was the first time the HI State Legislature provided for facilities funding in the charter school law. Even if this funding is made available in the future, it will not be adequate to construct state-of-the-art STEM facilities. At this time neither school is operating in adequate facilities, and funding for a STEM facility for Kua ëo Ka La will be needed immediately. Meanwhile, Voyager will continue to seek an adequate site which can be renovated to meet the requirements and become the second model STEM center in this project.

Kua ëo Ka La is located in the Puna district on nearly 600 acres of land next to the hot pond. The Directors´ vision is to restore the land to a pristine condition and teach students to honor the traditions and culture of the Hawaiian people as well as learn the skills they´ll need for a bright future. The Directors vision includes a model STEM classroom building combined with a dormitory to house visiting teachers and scholars desiring to study and learn how to re-create a completely sustainable, futuristic school. Already students at Kua ëo Ka La are engaged in integrated projects related to botany, agriculture, and technology. They are poised to expand the curriculum and the way students and teachers work together with a more futuristic approach to science, technology, engineering and math. Robotics is one example and this school has already begun hydro-farming at an impressive level for both the students and the local community. The prospects for pharmaceuticals, healthy foods, and rain forest restoration, and are definitely possible from the hydro-farming with STEM assistance.

Voyager delivers instruction using TQL (Total Quality Learning based on Dr. Deming´s theory process and tools); Reuven Feuerstein´s Instrumental Enrichment (IE); and Quantum Learning (QL) techniques to encourage critical thinking and continuous improvement in their students. Voyager´s visionary principal has established a team of teachers dedicated to providing an excellent education for all students. Unfortunately, they do not own any land, and they are currently located in a warehouse converted into a strip mall, but the school occupies an area that has had very minimal renovations. Thus, the students are taught largely in a cavernous area mostly without walls. As enrollment expanded additional space across the parking lot and street had to be leased. Such conditions do not create the best environment for learning, yet Voyager´s students have always performed well on the HSA tests.

Voyager´s leaders know that their students can achieve excellence in a peaceful setting. They focus on helping students from diverse populations learn how to work together to accomplish difficult tasks. Like many of America´s schools, Voyager realizes the need for massive curricular change especially in mathematics. It has already become a beacon for other charter schools interested in learning about and being coached in TQL and Instrumental Enrichment. One additional benefit of having Voyager involved in the project is to conduct and publish research about the impact of Voyager´s three modalities, TQL, IE, and QL (listed in the first sentence of the previous paragraph) on the futuristic curricula.

We consider this project to be self-sustaining after five years, although every effort will be made to become self-sustaining in three years. We plan that the facilities constructed on the Big Island and also on Oahu will be named for the funder into perpetuity as a sign of thanksgiving for the funder´s vision.

To ensure effective and efficient processes and wise use of money, we will use the ìBaldrige framework education criteriaî for self-assessment purposes at the end of each year. The Baldrige is an effectiveness model, widely used around the world and recognized as the gold standard for organizational performance excellence. Formal feedback will be given after a review of the annual self-assessment and used by the project coordinators, principals, and school leadership teams to make improvements to the system.

FIRST YEAR OF FUNDING

During the first six months of the project we will focus on facilities planning and construction at Kua ëo Ka La, Baldrige training, and the development of curricula at both schools to reflect STEM and futuristic approaches to learning math in particular.

A futuristic, age appropriate math curriculum will be developed by Marko Rodin, and teachers will receive the necessary training prior to the start of the following school year.

During this year, Voyager school leaders with the Project Coordinators will seek alternative facilities. Plans for renovation will be drawn to create a state-of-the-art STEM center at the new site.

The Hawaii Charter Schools Administrative Office Administrator will be responsible for coordinating schedules and events, and also recruit and interview teachers to participate in the summer program. She will also disseminate information to other charter schools as the project moves forward to generate enthusiasm for and curiosity about the project. In this way, there will be a desire to observe and learn more firsthand about the impact on student learning from the state and federal government, HI department of education, and others around the country. In addition, this person will oversee start-up STEM programs at other charter schools through the life of the project.

Regular, systematic action research will be conducted by the Project Coordinators throughout the life of the project. Further, Coordinators will provide quarterly on-site coaching assistance to the Principals and school leadership team as they make the desired changes.

A website will be created so that information among and between coordinators, principals, teachers, consultants and the HCSAO administrator can be shared. The website will be password protected to allow confidential student data and information to be shared (need basis only) and used for guidance and for continuous improvement of the curricula, based on a root cause analysis. Webcams will allow for greater communication and problem-solving. This will allow

professionals from both schools to learn from each other and may be used by students for any joint projects.

We anticipate regularly scheduled video conferences with the project professionals will advance the capacity of both schools to obtain full deployment of the futuristic approach and ëfast track´ the project effectiveness. Marko Rodin will provide regular two-way video conferences to answer questions specifically related to mathematics and to demonstrate math lessons. This will leverage the knowledge of the math expert and give teachers more support and coaching without the expense of having him do a lot of traveling.

A technology support person will be hired at each school to assure the equipment remains in good condition, handles repairs, and assists teachers and school leaders with any technology-related questions and problems. This position will be funded jointly by the school and the project. After three years, the full responsibility will rest with the schools.

SECOND YEAR OF FUNDING

Kua ëo Ka La will begin the school year using the new curricula and approach. Voyager will begin using the aspects of the new curricula that are feasible in a more traditional setting. Coaching will be provided for the principals and also teachers. The project coordinators will spend one week each quarter visiting each school, conducting action research through observations, interviews, review of classroom materials, teacher supplemental resources, and student generated products, as well as hard data gathered from quizzes or tests of skill development.

Voyager will have acquired a new facility in the second year of this funding cycle, and renovations will be finished by the end of the first quarter of the 2009-10 school year. Once the renovations are complete, the expectation is that both schools will be fully engaged in the new approach to thinking ìoutside the boxî in STEM areas and supporting futuristic curricula.

THIRD YEAR OF FUNDING

Fifty (50) teachers from other charter schools will be invited to attend a week-long immersion summer session to be trained in how to teach using the newly designed mathematics curriculum while experiencing a new approach to thinking about what has to happen in futuristic classrooms at Kua ëo Ka La on the Big Island. The teacher participants will use web-cams and video cameras to document the botany, agriculture, and property development aspects of Kua ëo Ka La as they would apply to their classrooms. This material will be compiled to provide a virtual learning experience for teachers and students from all over the country during the next academic school year.

**Plans are underway to apply for a grant from NEH to partially fund the summer program for 50 teachers. This will include funding for travel for teams of teachers and a small honorarium for participation.

Teachers from Kua ëo Ka La, Voyager and the consultants will be actively involved in the professional development training, resource seminars, and assisting teacher-trainees to practice the skills needed to expand the program in their own schools. This approach will leverage the new approach each year of the funding to over 150 teachers who will not only integrate their new knowledge in the classroom, but also inspire their communities to start thinking in futuristic terms as they understand how to expand the use of STEM and the new curricular sponsored by this project.

Project coordinators and the HCSAO administrator will continue to visit the schools, review results, observe and interview students, and coach principals and teachers as part of a five year longitudinal research study.

FOURTH AND FIFTH YEAR OF FUNDING

Support services along the lines of coaching will continue to be provided to the principals and teachers at both pilot schools. Advanced training for teachers on STEM curricula will be delivered using state-of-the-art technology such as video-conferencing and individual web-cams.

Program coordinators will continue to review results, support improvements, and work with the consultant and educators to make curricula changes if results are not as expected or desired. This will be a continuous improvement approach that will gain national and international recognition and be disseminated by the program coordinators at conferences and in educational publications.

PROGRAM EVALUATION

Program evaluation will be conducted by a nationally recognized external evaluator, Telesis, Inc. The president of Telesis, Inc. has over 30 years experience in evaluation and assessment of grants, national/state/local and community projects. Final results of the project will be provided to the funder and also the program coordinators. These results will be published and disseminated to the HI State Board of Education, the HI State Legislature, the HI Department of Education, and widely throughout the country for any international groups desirous of learning.

It is expected that students from the pilot schools will outperform their peers beginning in the second year of the project on standardized, normed tests given each year in the springtime. They will also demonstrate advanced learning through teacher supplemental projects; student generated projects and by the products that they create. The student generated projects will be assessed by teachers, peers, local educators and community experts. Student enthusiasm for learning will be improved, and discipline problems will be tremendously minimized as students become engaged in the discovery of learning and the excitement of problem solving with higher order thinking skills. Satisfaction levels among students, parents, and staff will improve as the project proceeds and will be reflected in an increase in parental/guardian involvement in their child´s learning experiences.

PROPOSED FIVE YEAR STEM PROJECT BUDGET

2007-08
2008-09
2009-2010
2010-2011
2011-2012

FACILITY PLANNING

$150,000 (BI)

$150,000 (O)

0

0

0

CONSTRUCTION

3,000,000 (BI)

2,000,000 (0)

0

0

0

CONTRACT SERVICES

$ 115,000

$ 140,000

$ 140,000

$ 115,000

$ 90,000

Project Coordinator / Researcher - PT

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

– PT

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

$16,000

($800/day x 20 days)

HCSAO Administrator (1) – PT

$8,000

($800/day x 10 days)

$8,000

($800/day x 10 days)

$8,000

($800/day x 10 days)

$8,000

($800/day x 10 days)

$8,000

($800/day x 10 days)

Futuristic math teacher – PT

$50,000

(125 days)

$50,000

(125 days)

$50,000

(125 days)

$50,000

(125 days)

$50,000

(125 days)

Consultants – Curriculum (4)- PT

$40,000

($10,000 x 4)

$40,000

($10,000 x 4)

0

0

0

Technology Support – PT

$25,000

($25,000 x 1)

$50,000

($25,000 x 2)

$50,000

($25,000 x 2)

$25,000

($25,000 x 1)

0

TRAVEL

$ 12,275

$ 12,275

$ 12,275

$ 12,275

$ 12,275

Coordinators (2)

$800

Inter-island

($100 x 4 trips x 2)

$800

Inter-island

($100 x 4 trips x 2)

$800

Inter-island

($100 x 4 trips x 2)

$800

Inter-island

($100 x 4 trips x 2)

$800

Inter-island

($100 x 4 trips x 2)

Coordinator of Systems (1)

$3,800

Air to/from Florida

($950 x 4)

$3,800

Air to/from Florida

($950 x 4)

$3,800

Air to/from Florida

($950 x 4)

$3,800

Air to/from Florida

($950 x 4)

$3,800

Air to/from Florida

($950 x 4)

HCSAO Administrator Travel

$500

Inter-Island

($100 x 5 trips)

$500

Inter-Island

($100 x 5 trips)

$500

Inter-Island

($100 x 5 trips)

$500

Inter-Island

($100 x 5 trips)

$500

Inter-Island

($100 x 5 trips)

Lodging

(B & Bs)

$ 3,125

(25 nights x $125/night)

$ 3,125

25 nights x $125/night

$ 3,125

25 nights x $125/night

$ 3,125

25 nights x $125/night

$ 3,125

25 nights x $125/night

Rental car

$1,400

($280/week x 5 weeks)

$1,400

($280/week x 5 weeks)

$1,400

($280/week x 5 weeks)

$1,400

($280/week x 5 weeks)

$1,400

($280/week x 5 weeks)

Rental car gas

$150

$150

$150

$150

$150

Meals

$2000 total

$40/day x 20 days x 2 = $1600

$40/day x 10 days = $400

$2000 total

$40/day x 20 days x 2 = $1600

$40/day x 10 days = $400

$2000 total

$40/day x 20 days x 2 = $1600

$40/day x 10 days = $400

$2000 total

$40/day x 20 days x 2 = $1600

$40/day x 10 days = $400

$2000 total

$40/day x 20 days x 2 = $1600

$40/day x 10 days = $400