Reviewing Committee

First of all, I wish to thank the review committee for providing this award for continued research on student learning and implementing research-based STEM initiatives. It has provided opportunity to continue research work, advancing an operational paradigm of Cultural Based Education to initiatives into the STEM education that have not been explored, especially in computing science for Indigenous students. The 25% graduate research assistance, with the additional 25% assistance from the Office of Diversity, Equity and Community Engagement, for Fall 2012 and Spring 2013, has been a great assistance that freed time for full devotion to begin to understand the “How’s and Why’s” of cultural based education has impact upon Indigenous students. This beginning foundation, to understand the “How’s and Why’s” has laid the foundation of research that will continue within my doctoral work to broaden and add knowledge for advancing STEM within the Indigenous Educational Community.

Cognitive Apprenticeship versus Cultural Based Education

Originally, I was strongly considering Cognitive Apprenticeship for research but as one continued researching methods being employed for improving Indigenous student’s performance, Cultural Based Education provide more tenets applicable to Indigenous students overall, including STEM. Cultural Based Educational although somewhat simpler in approach employ many similar elements in curriculum and in operation within the classroom environment as Cognitive Apprenticeship and research has shown the tenets to be more agreeable with Indigenous students.

The late Dr. William “Bill” Demmert (1934-2010), the first Native American to receive a PhD from Harvard in Education, was a major proponent of Cultural Based Education. He was a long time advocated for Cultural Based Education (CBE) as an answer for improving Indigenous youth educational performance and experience. He advocated through research, leadership and associations with many relevant organizations such as the Northwest Regional Research and Laboratory (NWREL); Center for Research on Education, Diversity and Excellence (CREDE); and the Education Testing Service (ETS), Princeton, NJ. He was appointed by Congress for national assessments of Federal Educational programs. He saw Cultural Based Education, not as theory per se, but an operation based in theory. (Demmert, 2004) He says it is closer to a method, an operation for improving Indigenous student educational experiences and performance. (Demmert, 2004) In a way, my continued research honors the late Dr. Demmert. Many studies have revealed positive results grounded in Cultural Based Education approach tenets.

Overall it was found that both Cognitive Apprenticeship and Cultural Based Education were complementary of each other within the classroom, and both could work separately with equal results in the classroom environment, however, Cognitive Apprenticeship tenets do not address
underlying cultural issues and does not provide a cultural experience necessary for addressing those issues within increasing student performance.

Projects

There were two previous projects under the Indigenous Alliance out of the University of Alaska, Anchorage, AK, I worked with prior to the funding award, in which 22 students participated, that I taught Indigenous students on understanding the elements of a computer and how to building a computer. These two projects were conducted at the Ute Mountain Ute reservation where 12 Indigenous High School students participated, and on at the Southern Ute Reservation where 10 students, both Middle School and High School students participated.

The award funding extended the program to eight additional students who participated in the project held locally at the Denver Indian Center and extended Cultural Based Education research by adding to the curriculum cultural elements for impact.

Research

As stated in a previous section, Cognitive Apprenticeship was the main focus of the proposal submitted and it was found that both Cognitive Apprenticeship and Cultural Based Education were complementary of each other within the classroom and both could work separately with equal results in the classroom environment; however, it was observed that Cognitive Apprenticeship tenets do not address underlying cultural issues and do not provide a cultural experience necessary for address those issues within increasing student performance.

Although both do not address STEM and computing, combining both Cognitive Apprenticeship and Cultural Based Education with a computing and/or STEM emphasis complement each other in the classroom environment – a master/elder teaching/meeting the needs of less experienced as well as meeting the holistic needs for 21st Century and Indigenous education.

Secondly, with the funding I was able to continue as the teacher, participant observer, practitioner and researcher of Cognitive Apprenticeship and Cultural Based Education with a computing and STEM emphasis.

Results/Impact

In reviewing the proposed impact of the study submitted the following are some of the results achieved. The award combined with the associated award, has been a great assistance that:

- Freed time for full devotion to begin to understand the “How’s and Why’s” of cultural based education has impact upon Indigenous students. This foundation, to understand the “How’s and Why’s”, has laid the ground work for research that will continue within
my doctoral work to broaden and add knowledge for advancing STEM within the Indigenous Educational Community.

• It has provided time to compare theoretical frameworks and finding that Indigenous approaches to education have parallels in old methods made new again, such as Apprentice being reborn again through Cognitive Apprenticeship. Although both have positive points, it is found that Indigenous approaches with cultural compatible compare equally in some outcomes, however, Cultural Based Education is more holistic and enables opportunities for academic, as well as, introducing and building life skills and spirituality, prized by the Indigenous Community.

• The time also provided focus to develop better research questions for the upcoming dissertation proposal and doctoral research in seeking “how” Cultural Based Education curriculum elements have effect on Indigenous students and seeking to understand “why” those elements have effect on the identity and attitudes of Indigenous students who participated in previous programs. It is hoped the answer to the research questions will provide better curriculum and pedagogy in the future for improving the impact of Cultural Based Education integrating computing sciences for future skills and career development.

• The time also provided opportunity to research different methods and protocols. It was originally thought that just approaching the research from mixed approach may be the best methodological systematic applied analysis. After experimenting with this paradigm it was discovered that it seemed to be too limiting and need a more holistic exploratory approach to get at all the nuances of Cultural Based Education tenets. After more research on methods the Case Study approached was discovered and the method allowed for a more holistic approach that was culturally compatible.

• The funding helped build technical intellectual capital in underrepresented communities by being able to work with 38 students teaching to build computers. The funding also provided time with continued contact with students in the regular class who participated in the Indigenous Alliance Computer building class in both Middle and High school classroom activities. These activities helped close the growing digital divide minimally but also strengthen collaboration between CU’s institutes and departments with those underrepresented communities

• Lastly, after engaging in several months of research with several methods and protocols an instrument was developed using Cultural Based Education and some elements from Cognitive Apprenticeship. This instrument will be used to evaluate if the curriculum, by student interview response, met the criteria of Cultural Based Education tenets and continued to have similar effect of curriculum elements upon the Indigenous students,
although modified for computing. This instrument will be used in furthering research, measuring Indigenous student’s performance, and also to understand how and why these elements were effective during the workshop, including a longitudinal measure from 2010 to 2013 or three years after the workshop was conducted. The interviews with the participants will provide insight as to the effectiveness of the modified Cultural Based tenets with a computing emphasis. See the following two pages that showcase the instrument developed.

- The first instrument attempts to evaluate the curriculum from a Cultural Based perspective, as not present, emerging, developing and enacting. The instrument also attempts to draw parallels to those elements from student’s interview responses.

- The second instrument attempts to draw evidence from student responses on how and why the elements within the curriculum may have had effect based on the student interview responses, and also attempts to draw parallels to expected outcomes and elements within the curriculum, from the student’s interview responses.

- The “CB Assessment” section was an instrument suggested to measure the existences of Cultural Based curriculum criteria. Researching the literature this not studies have been found that employs this rubric instrument.

- The “CB Assessment” with the addition of “CB Elements” and “Pilot Objectives” instrument is novel and has not been found in researching literature, especially for understanding a pilot that has integrated Cultural Based Education with a computing emphasis. Integrating all the elements will be a novel and it is hope to be used to further understanding how Cultural Based curriculum has effect or no effect on student’s performance.
Chancellor Award Report
Calvin Pohawpatchoko

Exploring Pilot Native Science Curriculum
and Effect on Students

Curriculum Evaluation

Interview Response Prior
Interview Point in Time 1
Interview Point in Time 2
Interview Response End
Interview Response 2013

Not Present - NP, Emerging - EM, Developing - DV, Enacting - EN

CB Elements
- Indigenous Language
- Pedagogy
- Curriculum
- Leadership Decision Making
- Teacher Professional Development

CB Assessment
- Teacher/Student Working Together
- Language Literacy
- Connecting Lessons to Students
- Engage Challenging Lessons
- Dialogue over Lecture
- Learn Through Observation
- Encourage Decision Making
- Strong Positive Indigenous Id
d
- Practical Traditional Spirituality
- Responsibility to Family, Com, Soc
- Cognitive/Intellectual Skills Development
- Physical Development

Pilot Objectives
- Native Teachers
- Native Students
- Native Subject w/Technology
- Educational Site
- Professional Experience
- Career Exposure/Experience
- Realism of Project
- Academic Skills Development
- Research Skills
- Communication Skills
- Team Work Skills
- Special Speakers
- Talking Circle
- Maintain/Increase Identity
- Post-Secondary Exposure
- Critical Thinking
- Life Skills
- Indigenous Technology Usage
Chancellor Award Report
Calvin Pohawpatchoko

Exploring Pilot Native Science Curriculum and Effect on Students

How and Why Elements Effect on Student

Interview Response Prior
Interview Point in Time 1
Interview Point in Time 2
Interview Response End
Interview Response 2013

CB Elements
Indigenous Language
Pedagogy
Curriculum
Leadership Decision Making
Teacher Professional Dvlpmnt

CB Assessment
Teacher/Student Working Together
Language Literacy
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Pilot Objectives
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Native Subject w/Technology
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Career Exposure/Experience
Realism of Project
Academic Skills Development
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Team Work Skills
Special Speakers
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Indigenous Technology Usage