Evaluation of the Idaho, Nevada, and New Mexico NSF EPSCoR Track 2 Project

Q1 Report

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Section 1. Executive Summary

1.1 Overview

On September 1, 2009 Idaho, Nevada, and New Mexico NSF EPSCoR joined projects forming a consortium of EPSCoR states with similar research agendas related to climate change and water resources. The consortium model significantly increases opportunities for scientific collaboration and enhances each state's ability to secure competitive funding and tackle complex climate change research agendas. Project leads, scientists and educators from the three states met in New Mexico, November, 2008 and Idaho, December, 2009, to create a coordinated Cyberinfrastructure (CI) research and development plan to serve both as a platform for future climate change research collaborations and the foundation for the Tri-state NSF EPSCoR project.

The primary goal and three objectives of the Track 2 EPSCoR project are:
Project Goal - Knowledge transfer

- Objective 1 - Connectivity
- Objective 2 - Interoperability
- Objective 3 - Cyberlearning

From August to November 2011, SmartStart Educational Consulting Services conducted a formative evaluation of the NSF Tri-state EPSCoR project. The focus of this quarter's evaluation is to identify activities that are being conducted and to assess the quality of those activities and the evaluation forms that are being used to evaluate them. The evaluation is progressing towards assessment of impact on project participants based on project goals and objectives by developing output and benchmark/milestone tables. Evaluation results of the following EPSCoR activities that were conducted during Quarter 1 are included in this report:

- Idaho Educational Materials Development programs
- Nevada Education Materials Development programs
- New Mexico Educational Materials Development programs
- New Mexico Super Computing Challenge (SCC) programs
- New Mexico Growing up Thinking Scientifically (GUTS) student programs
- New Mexico CI for Industry
- Tri-State Cyberinfrastructure (CI) Training opportunities
- Development of outputs by institution
- Benchmarks and milestones to track achievement of project goals
- Impacts video clips

1.2 Findings

Based on the results of this evaluation the following commendations and recommendations for the Tri-State EPSCoR project have been identified. Program leaders have done an excellent job increasing the number of women represented among each of the programs. It is clear that there is also a trend among GUTS participants that more underrepresented minorities are participating in EPSCoR programs. Continue to work towards involving more underrepresented minorities in this EPSCoR project and activities. Advertise and publicize activities and events more widely

and make a greater effort to personally invite individuals from underrepresented groups to apply for CI training opportunities and be a part of the curriculum development teams.

Participants of each program that was evaluated this quarter assigned high ratings to program components and made useful suggestions for improvement. The evaluator made recommendations at the end of each program component section of this report. Review participants' suggestions as well as the evaluators' recommendations to improve each program. The evaluator will work with program leaders to implement recommendations.

Significant progress has been made in developing a plan to identify and record impacts of this EPSCoR project. The evaluator has also developed an outputs chart to help bridge the connection between outputs and outcomes and to track activities that are leading to the achievement of short and long-term project goals. Leadership team members and participants have begun to think about impacts this project is having on participants, institutions, and the community. The evaluator recommends that project leaders continue to have conversations about how outputs lead to short and long-term impacts.

Section 2. Introduction

2.1 Background

On September 1, 2009 Idaho, Nevada, and New Mexico NSF EPSCoR joined projects forming a consortium of EPSCoR states with similar research agendas related to climate change and water resources. The consortium model significantly increases opportunities for scientific collaboration and enhances each state's ability to secure competitive funding and tackle complex climate change research agendas. Project leads, scientists and educators from the three states met in New Mexico, November, 2008 and Idaho, December, 2009, to create a coordinated Cyberinfrastructure (CI) research and development plan to serve both as a platform for future climate change research collaborations and the foundation for the Tri-state NSF EPSCoR project.

The mission of the National Science Foundation (NSF) Experimental Program to Stimulate Competitive Research (EPSCoR) is to assist NSF in its statutory function "to strengthen research and education in science and engineering throughout the United States and to avoid undue concentration of such research and education."
EPSCoR goals are:

- To provide strategic programs and opportunities for EPSCoR participants that stimulate sustainable improvements in their R&D capacity and competitiveness;
- To advance science and engineering capabilities in EPSCoR jurisdictions for discovery, innovation and overall knowledge-based prosperity.

EPSCoR objectives are:

- To catalyze key research themes and related activities within and among EPSCoR jurisdictions that empower knowledge generation, dissemination and application;
- to activate effective jurisdictional and regional collaborations among academic, government and private sector stakeholders that advance scientific research, promote innovation and provide multiple societal benefits;
- To broaden participation in science and engineering by institutions, organizations and people within and among EPSCoR jurisdictions;
- To use EPSCoR for development, implantation, and evaluation of future programmatic experiments that motivate positive change and progression.

The primary goal and three objectives of the Tri-state EPSCoR project are:
Project Goal - Knowledge transfer
The Track 2 project will promote knowledge transfer to scientists, educators, students, and citizens within and beyond the Consortium by enhancing state CI, and to enable the community science that is required to address regional to global scientific and societal challenges.

Objective 1 - Connectivity

Significant effort will focus on promoting communication and collaboration by improving connectivity infrastructure within the Consortium. Proposed and future Consortium efforts related to improving research competitiveness, STEM education, and economic development rely on this basic infrastructure.

Objective 2 - Interoperability

The Consortium will promote discovery by supporting community-based climate change science through enhanced interoperability between models and other software components, improved access to and usability of Consortium data products through the adoption of standards-based data management and access models, and new data assimilation, analysis, and visualization capabilities.

Objective 3 - Cyberlearning

The Consortium will enhance learning by focusing particularly on graduate student and postdoctoral researcher development; extending cyberenabled science education into middle and high schools and extracurricular programs; and improving outreach to business and industry

Tristate EPSCoR project components include:

- Idaho Cyberlearning educational materials development
- Idaho McCall Outdoor Science School (MOSS) summer institute
- Nevada educational materials development
- Nevada summer science institute for teachers
- New Mexico CI for Industry
- New Mexico educational materials development
- New Mexico SCC/GUTS student programs
- New Mexico SCC/GUTS summer teacher institute
- Tri-state Interoperability component evaluation
- Tri-State Consortium annual meeting and workshops
- Tri-state CI Training opportunities

2.2 Purpose of the Evaluation

Two types of evaluations are being conducted for EPSCoR project Track 2: (1) a formative evaluation to monitor implementation of project components and give ongoing feedback to the principal investigators, and (2) a summative evaluation to assess the quality and impact of the project in reaching its stated goals and objectives. Both types of evaluation use a combination of qualitative and quantitative indicators.

Guiding evaluation questions are based on the goals of this EPSCoR project.

Intellectual merit

- How has the addition of research and cyber infrastructure (equipment, facilities, people, and training) provided by the EPSCoR project affected Nevada's, New Mexico's, and Idaho's competitiveness for research funding and sustained partnerships as per the outputs/outcomes/metrics listed for the overarching goal and <u>each</u> of the 3 objectives listed in the evaluation plan?

Impact on project participants, schools, universities, businesses, and communities

- What impact has participation in the EPSCoR programs had on the development and direction of participants' educational and career opportunities and choices?
- In what ways has participation in the EPSCoR programs increased participants' understanding and use of cyberinfrastructure?

Impact on participating organizations and the scientific community

- In what ways did participants' take the knowledge they acquired in EPSCoR programs and transfer it back into the classroom, school district, university, agency and/or community in a meaningful, productive way?
- How has involvement in the EPSCoR project benefited participating agencies, offices, divisions, departments, schools, universities, etc?
- In what ways have the participating agencies, offices, divisions, departments, schools, universities, etc. changed as a result of participation in this project?

From August to November 2011, SmartStart Educational Consulting Services conducted a formative evaluation of the NSF Tri-state EPSCoR project. The focus of this quarter's evaluation is to identify activities that are being conducted and to assess the quality of those activities and the evaluation forms that are being used to evaluate them. The evaluation is progressing towards assessment of impact on project participants based on project goals and objectives by developing output and benchmark/milestone tables. Evaluation results of the following EPSCoR activities that were conducted during Quarter 1 are included in this report:

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Section 3. Evaluation Findings

3.1 Evaluation of project components

A. Idaho Educational Materials Development programs

Background

The **Cyber-enabled Curriculum and Education Materials Development** for middle and high school students program endeavors to use climate change as the underlying theme, to expand Cyberinfrastructure awareness, increase use of Cyberinfrastructure, and integrate quantitative reasoning, data analysis, and climate change modeling with education through support of cyber-enabled curriculum and education materials development for middle and high school students.[1]

Two researchers received funding from EPSCoR Track 2 to integrate cyberlearning into the ISTCS STEM classrooms. Being located in Blackfoot, Idaho poses restrictions on the availability and variety of guest speakers. The project utilizes cyber-technology in the classroom to become linked (in real-time) with professionals throughout America and beyond in the professionals' real-world STEM settings. The purpose of this project is to expand students' accessibility to presenters. Using WebEx, an online video chat, students are connected to professionals (engineers, nurses, scientists, etc.) worldwide and conduct discussions regarding their professions and their impact upon our world. The cyber-technology provides the opportunity for teachers to be able to arrange these cyber-sessions in order to facilitate discussions between students and STEM professionals on climate change and other topics of interest. These cyber-sessions are then recorded, catalogued, and shared with the Idaho Education Network (IEN), allowing teachers from schools who do not have the connectivity equipment to have the live presentations streamed into their classrooms, giving Idaho students from rural areas the opportunity to learn from career professionals and to complete student inquiry- and problem-based projects.

Through the shared resources, teachers statewide can initiate further projects in which students will identify and share strategies for their personal involvement as stewards in the protection of our environment and in the advancement toward environmental science.

Program leaders state, "Research continues to suggest that middle school students are in the process of deciding whether they like math or science, regardless of how well they perform in those classes. It is anticipated that when students have the unique opportunity to engage in discussions with STEM professionals throughout the world, students' perceptions of career possibilities will be greatly expanded as they see the application of math and science beyond what they see in school…supporting the "students in STEM" pipeline initiative. Through the shared resources, teachers statewide can initiate further projects in which students will identify and share strategies for their personal involvement as stewards in the protection of our environment and in the advancement toward environmental science."

The goals of this curriculum development program are to:

1. Improve students' attitudes towards math and science
2. Increase students' knowledge about career opportunities in math and science
3. Increase teachers' incorporation of math and science projects into their curriculum

[1] Grant proposal to Tri-state EPSCoR

Assessment Development and Data Collection

The external evaluator developed and conducted an educational materials development survey (Appendix A) to assess the curriculum development process, the quality of the education materials, and the expected impact of the materials on teachers and students. The evaluator posted the survey online and emailed a survey link to the curriculum developers. The curriculum developers also conducted a process evaluation while implementing the Cyber-enabled Curriculum. Students completed a group project to demonstrate knowledge gained about climate change. The project had three sections 1) identify a problem, 2) solve the problem, and 3) present to the class. The project was worth 400 points. The curriculum developers created a grading rubric to assess the quality of student projects. The rubric had the following sections and point values:

- Identify a problem - 50 points
- State the problem clearly – 50 points
- Collect Information – 50 points
- Develop Possible Solutions – 50 points
- Select the Best Solution – 50 points
- Implement the Solution – 50 points
- Evaluate the Solution – 50 points
- Create a multi-media presentation and present to the class – 50 points

Students' grades were sent to the evaluator to be included in the current report.

Evaluation participants

Dr. Rita McNeil, a professor at Idaho State University (ISU) in the Human Resource and Training Development department, and Chad Majeske, a middle-school technology education teacher at Idaho Science and Technology Charter School (ISTCS) and graduate student in the Master of Training and Development (MTD) program at ISU, are involved in materials development funded by the Track 2 EPSCoR project in Idaho. Their contact information is shown in Figure 1.

Figure 1. Idaho educational materials development team

Name	Position	Affiliation	Email
Rita McNeil	Faculty	Idaho State University	kolorita@isu.edu
Chad Majeske	Teacher Master's student	Idaho Science & Technology Charter School Idaho State University	chad.majeske@idahoscitech.com

Both of the curriculum developers participating in the project completed the evaluation form. One is male and one is female; both are Caucasian. One is a middle/high school teacher at Idaho Science & Technology Charter School and a Master's degree student at Idaho State University, the other is a professor/instructor at Idaho State University. One has been working as part of the educational materials development team between one to two years and the other for less than six months.

Evaluation findings

Curriculum development process

The two curriculum materials developers were asked about the process they used to develop, test and refine the educational materials. Because both developers worked on the same curriculum, the process they outlined was similar in nature. Both curriculum developers described a process that included defining project parameters, desired outcomes, and materials to be used to implement the curriculum. Below is the full outline that they each reported utilizing to develop their curriculum:

- *The first step was to identify the project and desired outcomes from the students. The next step was to identify which materials the school lacked to complete the project. One item, the web purchase, didn't work with WebEx, the software purchase. A different web camera was purchased by the school, which worked well with WebEx. During the web conferencing between the professional the students everything ran as expected.*
- *1. Once the project parameters were determined and technical considerations were in place, we then began to develop an overall project plan and a detailed lesson plan. The project plan included details in (a) selecting a topic; (b) recruiting a presenter; (c) communicating student research expectations in preparation of the presentation; (d) executing the logistics for the presentation; (e) facilitating the presentation; and (f) guiding and monitoring progress of student projects; and (g) showcasing the students in the presentation fair.*
  2. The lesson plan was designed and edited/revised according to the Construct-Centered Design process.
  3. We recorded the presentation, which originated with an environmentalist in New Zealand, using WebEx. The recording, and subsequent recordings, will be made available on the IEN along with accompanying materials and recommendations for replication.
  We have had only one opportunity to complete the project cycle. The materials worked as planned and thus far, we have not identified any need to revise them. The test will come when the cyberpresentation is published on IEN from which other teachers will have the option to select and replicate the project.

The developers were asked if the lesson planning followed a specific research-based lesson plan process. The six-step Construct-Centered Design lesson plan process was followed.

- *As recommended in the Project Call for Proposals, we followed the 6- step Construct-Centered Design lesson plan process.*
- *Construct-Centered Design was the lesson plan process. There are 6 steps to the process. The steps are:*
  Step 1: Select the big idea:
  Step 2: Unpack the big idea (construct)
  Step 3: Create a claim
  Step 4: Specify what evidence you will expect that a student has the desired knowledge.
  Step 5a: (assessment): Design particular tasks, questions, or situations (assessment tasks).
  Step 5b: (instructional materials): Design particular learning activities (learning tasks).
  Step 6a: Review assessment tasks.
  Step 6b: Review learning tasks.

Developers described the materials they have developed so far during the curriculum planning process. Both developers listed the project plan outline. However, one developer pasted the entire project plan into the survey. The other developer reported the following:

1. The project plan (outlined in the attached interim report of August 4, 2011)
2. The 2 lesson plans (the first is included in the attached interim report; the second is attached as a separate file.
3. The recording
https://idahoscitech.webex.com/idahoscitech/ldr.php?AT=pb&SP=MC&rID=89437137&rKey=24cd16c79cc30e25

When asked whether sufficient support and guidance was received from program leaders, one developer responded yes and provided an explanation. The other developer reported that the program leaders were the ones implementing the program suggesting that there was no one else from whom to seek support.

- *As this project was an original design, rather than a replicated study, we felt we had a certain amount of latitude to create the project components according to our assessment of successful learning experiences. Programs leaders were available by phone and by email to supply any additional information requested.*
- *The program was implemented by the program leaders.*

Curriculum developers made suggestions on how to improve the educational materials development program. Their comments are below:

- *Although this is not a suggestion, I look forward to the feedback from other teachers as they replicate the project and provide recommendations for improvement.*
- *My only suggestion would be not to purchase IP web cameras for the project.*

Achievement of project goals

The primary goal of the cyberlearning portion of the Track 2 EPSCoR project is to use cyberinfrastructure to integrate research with education in order to promote knowledge transfer. Curriculum developers rated on a scale of 1-5 (1=not at all, 5=achieved extremely well) how well they think this educational materials development program is achieving this goal. Both curriculum developers rated goal achievement as a *5, achieved extremely well*.

Curriculum developers explained why they assigned the highest possible rating to goal achievement. Both stated that cyberinfrastructure was implemented into the curriculum and students were required to use what they learned through cyberinfrastructure to complete class projects. Their comments are listed below:

- *All the research the students perform was via the internet. From this research, students proposed a possible solution to the specific program they chose to solve. This solution was then presented to an expert using web conferencing software. Other than the guidance to stay on track and the supervision of school equipment students the teacher played a minor role in transfer of knowledge to the students.*
- *This project, to date, has exceeded my expectations. The cyberlearning experience heightens the knowledge transfer in numerous ways:*
  1) Because students spend their research time prior to the presentation in preparing to actually engage with a live person, their motivation to delve into the topic is heighted because this is not a hypothetical activity…they will be conversing with a live professional.
  2) Rather than learning about a particular environment or topic, the students are actually connected to it real time and ask clarifying or probing questions as they arise. Therefore, the immediacy of the experience strengthens the potential for acquisition, retention, and recall of content presented.
  3) The repetition of content through individual inquiry prior to the presentation, further information gathered through the presentation, and then compiling and applying their new learning in a creative experiment/project to solve issues and test hypotheses not only reinforces the content covered, but also reinforces the process involved in inquiry-based learning. The intent, of course, is that students will continue to adopt and model this learning process in self-directed ways throughout their academic and professional careers.

Impact of curriculum materials development project

Curriculum developers' comments

Curriculum developers explained the impact they believe this project will have on them professionally as well as the impact it will have on teachers and students.

Personal Impact

- *Being relatively new to STEM Education and never having been involved in EPSCoR prior to this project, I am learning new aspects of instructional technologies that can be incorporated into other aspects of my professional practice. I am also very appreciative of the funding granted as it is advantageous to include this is my portfolio for tenure and promotion.*
- *In order to develop the lesson plan I had to study, research and watch recorded webinars on Construct-Centered Design. I have recommended this process to other teachers.*

Teacher Impact

- *The impact for teachers throughout the state of Idaho is that they can expand the global exposure they provide to their students through the statewide access to the recorded presentations. Not only can the teachers access the presentations, but might also be able to create and contribute to the collection, thus growing the resource base for teachers.*
- *Teachers often have great ideas to inspire students, but lack the ability to make real world and career connects. The materials used in this project helps to close the connection gap.*

Student Impact

- *I believe that the greatest impact of the project is enjoyed by the students. As Idaho is a rural state, students don't always have access to international resources. This project not only creates opportunities for students to visually experience the presenters' environments but also provided the rare opportunity for students to converse with the presenter in real time, to ask questions and even follow-up questions, and to feel engaged in the learning process…not as a spectator, but as an actual participant.*
- *Students made a more personal connection with the content they were studying. When students knew that they were presenting to an expert, and not just the teacher, they put forth more effort than on previous projects. Secondly, after the webinar with the expert, students were talking about the experience for the next several days at school and what a positive experience it had been.*

Student impacts

After participation in the cyberlearning materials curriculum, a class of 8th grade students completed a project in which they identified a problem related to water resources, followed a problem-solving process to recommend a solution, constructed and implemented their solution, and conducted a multi-media presentation about their project. Of the 16 students who completed the project, 69% were female and 94% were Caucasian (one student was mixed race). Students did extremely well on the project. Three-quarters received one-hundred percent on the project. Student demographics and scores they received on their projects are illustrated in Figure 2.

Figure 2. Demographic description of student participants

	Student participants (n=16)	
	#	(%)
Gender		
Female	11	69%
Male	5	31%
Ethnicity		
Caucasian	15	94%
Other	1	6%
Scores		
100% (A)	12	75%
80% (B)	2	25%
72% (C)	1	6%
60% (D)	1	6%

Commendations and Recommendations

1. Curriculum developers are commended for having a research-based lesson-design and a well-documented curriculum development process. Developers are encouraged to create a plan outlining when/if future lessons will be developed and implemented. If future lessons are planned, the evaluator should be included in development of the formative and summative assessments.
2. Curriculum developers should also create a dissemination plan that explains how they will share their lesson(s) with other teachers, schools, and districts.

B. Nevada Educational Materials Development Programs

Background

The purpose of the year two activities for **Nevada Climate Change and Cyberlearning Education Materials Development** (http://climatechange.education.unlv.edu/?q=node/153) entitled C4D is to build four cyberlearning curriculum modules to support a teacher professional development summer science institute. The topics of the four modules are:

1. Earth - Geologic Time - Environment of Formation - Students examine how energy environments govern the type of rock formation and rock features indicate environment.
2. Earth - Continental Drift - Location of Formation - Students examine how the movement of continental plate can affect climate. (Insulation and albedo can affect changes in climate)
3. Regional - Cycles and Regional Environment of Formation- Students examine how small changes in environments can be recorded within the rock record (evaporatic rock systems, i.e. salt flats).
4. Local - Evidence of Environmental Changes with Climate - Students use the Pinnion-Juniper forest as a model for examining how the rate of climate change can be used to predict future environments (Death Valley).

According to the project lead a formative evaluation of the usefulness of materials and a summative evaluation of the impact of the materials for the participants of the summer institute is being conducted (http://climatechange.education.unlv.edu/?q=node/136). Evaluation instruments and results are not yet available.

Assessment development and data collection methods

The external evaluator used the same educational materials development evaluation form (Appendix A) with this project as was used with the Idaho project to assess the curriculum development process, the quality of the education materials, and the expected impact of the materials on teachers and students. The evaluator posted the evaluation form online at www.zoomerang.com and emailed a link to the project leaders who then emailed the link to the curriculum developers. Three reminders were sent from the project leaders to the curriculum developers to complete evaluation form.

Evaluation participants

Nevada hired a faculty collaborator (Schrader) and a graduate student (Skaza) to lead the curriculum development team. The team includes faculty, teachers, and a curriculum developer from the Curriculum and Professional Development Division (CPDD) of the Clark County School District and a content development specialist. The primary content developer, Patricia Mynster, is from the Climate, Adaptation, Mitigation, E-Learning (CAMeL) grant, a free online resource to pioneer undergraduate education on climate change causes, consequences, and solutions (http://www.eoearth.org/article/About_CAMEL?topic=49491). CAMeL is developing an extensive, high quality, vetted collection of climate related educational materials that incorporate a broad array of cyber content types. The team has been meeting biweekly since January, 2011 to plan the curriculum development activities. Members of the development team are shown in Figure 3.

Figure 3. Nevada educational materials development team

Name	Position	Affiliation	Email
Nya Berry	Teacher	Green Valley HS	nberry@interact.ccsd.net
Kris Carroll	Curriculum developer	CCSD-CPDD	kcarroll@interact.ccsd.net
Laura Doughty	Teacher	West Career and Technical Academy	lldoughty@interact.ccsd.net
Stephanie Galka	Teacher	Western HS	smgalka@interact.ccsd.net
Cindy Kern	Teacher	Green Valley HS	clkern@inertact.ccsd.net
Tracy Morris	Teacher	Palo Verde HS	tsmorris@interact.ccsd.net
Patricia Mynster	Content developer	CAMeL grant	tmynster@hotmail.com
PG Schrader	Faculty	UNLV	pg.schrader@unlv.edu
Heather Skaza	Graduate student	UNLV	hjskaza@hotmail.com
Ryan Zeedyk	Teacher	Green Valley HS	rdzeedyk@interact.ccsd.net

All of the curriculum developers completed the evaluation form. The majority are Caucasian (90%), female (70%) middle/high school teachers (60%). Seven institutions were represented and half state they have been working with the educational materials development team six months or less. A full list of demographics is shown in Figure 4.

Figure 4. Demographic description of Nevada curriculum developers

	Curriculum Developers (n=10)	
	#	(%)
Gender		
Female	7	70%
Male	3	30%
Ethnicity		
African-American	1	10%
Caucasian	9	90%
Role[2]		
Middle/high school teacher	6	60%
Program administrator	1	10%
Support staff	1	10%
University professor	2	20%
Doctoral student	2	22%
Master's degree student	1	10%
Project facilitator for 6-12 science	1	10%
Institution		
Clark County District	1	10%
Foothill High School	1	10%
Green Valley High School	2	20%
Palo Verde High School	1	10%
West Career and Technical Academy High School	1	10%
Western High School	1	10%
University of Nevada, Las Vegas	3	30%
Years working on the educational materials development team		
6 months or less	5	50%
7-12 months	1	10%
13-24 months	2	20%
25-36 months	2	20%

[2] Percentages do not equal 100 because some people selected more than one response.

Evaluation findings

Curriculum development process

Curriculum materials developers explained the process they used to develop, test and refine the educational materials. Two curriculum developers reported using the 5_DIE framework to develop test and refine educational materials. The majority of curriculum developers described a process of breaking up into smaller groups, developing a curriculum and then going through an iterative process of refining based on recommendations from other group members. Below is the full outline that they each reported utilizing in developing their curriculum:

- *The development design team, myself and two others, used the 5-DIE framework and the content focus question of "How has climate changed with respect to geologic time?" to develop a framework for the curriculum. From the framework, a nestled 5-DIE approach, we discussed the main geological constructs and the underlying climate change principles that needed to be addressed with each of the three major sub-lessons. Training on content, design, and use of technology tools for learning was provided to the groups of lesson writers. As the lessons were developed, several stages of review and feedback afforded the opportunity for quick changes and greater coherence among the lessons. The materials were tested by alternating team members on different platforms to ensure that the focus of the learner would be on the content presented in the 5-DIE framework and their understanding of climate change.*
- *We met as a team to discuss topics to be taught during the summer high school science institute and then broke up into smaller teams to develop the curriculum. There were periodic meetings to learn about technology used in the development of the three modules. Discussions of progress and how to improve the modules happened at every meeting.*
- *The leaders presented the goal of the project. The team was divided into smaller groups, each with their own lesson to create. Over a series of meetings each group would present their findings. The other groups would critique and offer suggestions. Each group would make changes, and the process would repeat until everything was complete.*
- *I have participated in two collaborative workshop style curriculum building sessions, developed 4 climate change lesson through this process, and developed 5 additional lessons based upon the training. Implementation of curriculum has involved pretest, posttest, delayed posttest measures, statistical analysis of data, revision of curriculum materials, and reimplementation.*
- *Our curriculum development team of about 12 members broke into smaller groups of 3 to work with those we worked best with. Each group developed their own subunit to put together into the larger final unit. Information was posted through moodle for everyone to access, and once a month or so everyone would meet up to share what their group had come up with and receive criticism towards the final project.*
- *Scaffold, 5 DIE approach with team*

The developers were asked if the lesson planning followed a specific research-based lesson plan process. The majority reported using the 5-DIE design.

- *The lesson planning and the framework for the lessons were heavily based upon the 5-DIE design. The 5-Dynamic Inquiry Enterprise is a research design model developed during a year long research and curricula design process for a large virtual high school. The features of the 5-DIE model afford its use as both a lesson design structure and a framework for curriculum units. In our design we used the 5-DIE model as both the lesson design structure and the unit framework.*
- *Yes, argumentation. Argumentation uses a method of supporting a hypothesis for the learning goal. One starts with a claim, then gives a rationale for that claim and then backs it up with a warrant for the rationale. Argumentation mimics scientific research.*
- *For this project we followed the 5-DIE (5-Featured Dynamic Inquiry Enterprise) approach from Carroll, Kern, Ebert & Crippen*
- *I use the 5DIE design framework to develop lessons.*
- *Our lesson planning follows the Vee Diagram process in combination with evidence based claim statements.*
- *5 Die. Start with question, give them some data, ask questions, lead back to research question, present.*

Developers listed and described materials they have developed so far during the curriculum planning process. Curriculum developers most frequently reported developing a series of lesson plans. Full responses are outlined below.

- *In our project, there were 3 lessons that were designed, written, and implemented within the cyberlearning environment as a component of the 2011 High School Summer Science Institute. The cyberlearning component of the institute was designed to be a major component of the Institute and serves as both a content knowledge builder and communicative tool for the participants to discuss climate change from different spatial and temporal perspectives within the specific context of the Death Valley area. Each of the lessons focused upon a different aspect of spatial or temporal understanding of Earth's climate. This cyberlearning component of the larger Summer Science Institute provided educators with the foundational components to understanding climate change on a geological time scale, with provided the scaffold to participate in field research in Death Valley NP to discuss current understanding of climate change. Further, these materials were and are available to educators to use with students. In knowing this goal, our design team worked to develop materials that are appropriate for both adult learners and high school students.*
- *We used Google Earth and web-based research to devise a lesson where students would place pins of the location of Death Valley on maps of the earth over time. There were pictures of fossils from each time period from one billion years ago to thirty thousand years ago and around fourteen times in between. Students were instructed to back up the claim that Death Valley was once found at the equator and even in the Southern Hemisphere several million years ago with evidence from the Google Earth file and pictures of the fossils. They also were instructed to read several articles on the "Snowball Earth" theory to back up their claim. The intended audience was high school science teachers in the Clark County School District.*
- *Summer Science Institute 2011 - Geologic Time, High School students.*
- *I have developed 9 lesson meant for a blended learning environment that include topics pertaining to impact of global climate change on the Great basin region, impact of decision making on global climate change, impact of climate change on the energy flow in an ecosystem, impact of climate change on predator prey relationships, deep-time climate change. All lessons were intended for 9-12*
- *We developed a lesson plan for using Death Valley as an indicator of climate change. Included was a Google Earth tour of Death Valley with different vegetation zones, Salt core data, paleogeographic overlays for Google Earth, and fossil evidence. Every section in the unit focused on the spatial and temporal resolution of the climate change evidence in Death Valley. The intended audience was middle and high school teachers attending a summer institute at Death Valley. The material was also intended to be taken by the teachers and directly implemented into their classroom as it was suitable for their students.*
- *Lesson plan based on sedimentary rocks in Death Valley. Look at the rocks there and how they show past evidence of drastic climate change.*

Developers explained when and how the materials will be used by teachers with students and in what type of learning situation. Curriculum developers most frequently reported that the materials were initially developed for a Summer Science Institute for teachers but that the materials are adaptive and should be available to any teachers in CCSD.

- *Many teachers in CCSD have already used the lessons and are offering them to their students. Specifically, teachers used the materials Spring/Summer 2011 and are providing the lessons to students in 2011-12 school year.*
- *The lessons were designed for any content management system. The teachers involved in the 2011 SSI were specifically using Moodle to access the lessons. All of these teachers were provided packages of the lessons that they would be able to use on any CMS that their school currently uses. I have been told that they are using them with students in both classroom situations and as homework assignments.*
- *I believe that they will be disseminated to those teachers in CCSD who ask for them, especially at schools with Environmental Science Programs or Geology.*
- *When: 2011-2012 Where: West Career and Technical Academy Learning situation: Project based learning setting*
- *UNLV and Clark County Teachers - Summer Science Institute 2011, Las Vegas and Death Valley, high school teachers at a 2 week class about global climate change*
- *The developed materials can be used with multiple course offered in CCSD, furthermore as cyberlearning lessons they are easily adapted to the needs of rural Nevada communities. Many of the lessons I have build are meant for a blended environment but can be adapted to completely online.*

- *The unit was put together as part of a summer development seminar for CCSD science teachers. They would work through the material as if they were a student. It was designed so those teachers could then take the exact same unit and implement it in their classroom to address climate change curriculum using Death Valley as an indicator.*
- *It was originally designed for a summer teaching institute that would visit death valley, but it was designed to be used in computer labs in school, so no site visit was necessary. It is designed to be flexible.*

When asked whether sufficient support and guidance was received from program leaders all respondents commented *yes*. Individual comments are as follows:

- *Yes, Dr. Crippen helped greatly. I worked with Dr. Crippen and two fellow educators on the 5-DIE design model. For this project, Dr. Crippen did an excellent job of helping me hone in on the main ideas of the overall framework design, and then the main sub-lessons that would best support the focus. Additionally, his help in developing solutions to technological problems was invaluable. As my fellow leaders and I worked together to inform and guide the writing team, edit and provide feedback about the content and the design to focus the writing team on how to leverage the strengths of the cyberlearning environment, and provided climate change content knowledge from a geological scale to the writing team, fellow leaders were there to help and support.*
- *Yes! I had not used Google Earth for very many things and I was able to learn how to add pins and import pictures to files. I also learned how to put a file together for the educational website Moodle using the EXE program.*
- *Yes, they provided templates, worked side by side with us, provided lots of resources (pictures, research articles).*
- *Yes, Kent Crippen has provided appropriate leadership and mentorship in the development, testing, and refinement of the curriculum materials.*
- *Yes. The program leaders were always available and prepared to offer feedback and criticism whether it was face to face meetings, Moodle, email, or Skype.*
- *Yes, weekly meeting, group work environment, technical support.*

Curriculum developers made suggestions on how to improve the educational materials development program. The most frequent comments were regarding the lack of time and opportunity for collaborations. Their comments are below:

- *As a curriculum expert, I can say that this was one of the best development programs. Supporting and developing creativity was a main underlying component of the project and as a leader in the project I felt strongly that this was a key to the success of the curriculum as measured by the feedback, usage and quality of work from the participants that have completed the lessons. A potential improvement, which would be specific to our past design, would be to integrate more disciplines of science into the development. This was not a previous oversight, but a time derived constraint. Furthering the project would afford the opportunity to explore the integration of many more science disciplines and the development of cyberlearning based climate change curricula.*
- *I think by having more time for collaboration during the development process.*
- *Currently, I am not sure anyone but myself and one other person is developing curriculum. I would personally like an opportunity to sit down with individuals in the area of research to learn how to bring the climate change data portal into the lessons.*
- *I felt that the program went very smoothly. We just need some more projects to work on as every member was very willing to continue development.*
- *The technical obstacles were the biggest. Hard to get the exe program to run on my computer.*

Achievement of project goals

As stated previously, the primary goal of the cyberlearning portion of the Track 2 EPSCoR project is to use cyberinfrastructure to integrate research with education in order to promote knowledge transfer. Curriculum developers rated on a scale of 1-5 (1=not at all, 5=achieved extremely well) how well they think this educational materials development program is achieving this goal. Eight (80%) rated goal achievement as a *5, achieved extremely well* and two (20%) rated goal achievement as a *4, achieved fairly well*.

When asked to explain their ratings of project goal achievement, several curriculum developers reported using Google Earth to develop curriculum fit for secondary education. Other curriculum developers generally stated incorporating cyberinfrastructure into their curriculum. Their comments are listed below:

- *The design and implementation of the lessons targets this goal as that was the initial goal used to conceive the design framework for the 2011 SSI and the lessons.*
- *I think that this will work for climate change in CCSD, but not for water resources knowledge, because we only focused on the former.*
- *Use of Google Earth*
- *It has had a strong impact on my teaching and my students learning in STEM education.*
- *Through the use of Moodle and Google Earth we developed a climate change unit that fits well into secondary science curriculum.*
- *We used cyberinfrastructure to deliver climate change lesson plans using deductive reasoning.*

Impact of curriculum materials development project

Curriculum developers explained the impact they believe this project will have on them professionally as well as the impact it will have on teachers and students. The majority stated they were able to grow as a curriculum developer/designer. They also reported that this project should increase knowledge for both teachers and students and incorporate new learning tools in the classroom. Comments for each impact area are listed below.

Personal Impact

- *Greatly! I was able to grow as both a curriculum designer, but also as a leader amongst my peers. The growth influence came from many direction as I learned more about designing materials for the cyberlearning environment, teaching colleagues about curriculum design, and honing the 5-DIE model for greater effect on scaffolding learning.*
- *I was able to learn and have experience with Google Earth and the EXE program in designing modules to be put onto Moodle. I had limited experience with building Moodle modules before, but extensive experience from the student's side. It was*
- *I think the 5-DIE method is wonderful. It does take quite some time to develop an entire lesson. I have tried to change some of my lessons into this format. I enjoyed meeting teachers from other schools, and working with graduate students in the science fields.*
- *I have had the opportunity to build climate change curriculum in a collaborative effort with university professors, scientist, fellow doctoral students and teachers. The experience has helped me to better understand teaching strategies and implementation, student learning, and the content associate with climate change education. C4D's donation of 10 MacBooks and a MacLearning lab has provided the opportunity for student engagement in a blended learning environment rich with the developed curriculum as well as opportunity to work with data available on the climate change portal. On a daily basis 240 students are using the MacBooks as a tool in their science education. Finally, the Moodle learning management system has provided students with a teacher developed cyberenvironment where they can exchange their science ideas with peers, build WIKIs, and review classroom materials. The overwhelming show of support C4D has provided secondary science students has contributed to student learning!*
- *Personally I was able to extend my network of capable professionals, especially with meeting the program leader, Dr. Crippen. My confidence in creating computer based models was also greatly increased, which I have been able to take into my classroom and utilize in my own lesson plans.*
- *Taught me a new way to design lesson plans.*

Teacher Impact

- *The design and implementation was intended to focus learners on the fact that climate change is a natural phenomenon of Earth. Further, that many of Earth's processes have historically governed climate change on a geological scale. Moreover, with the understanding of climate change from a geological perspective, teachers can better understand the current trends in climate change and the body of research behind current climate change understanding. I believe our lessons establish and scaffold learner understanding toward these goals.*
- *Teachers should be able to use these materials to enhance their teaching style through technology.*
- *Increase their knowledge of geology and climate change in order to help with students in their classes*

- *Hopefully they provide a model for good teaching*
- *The impact will be an increased awareness of how technology can enhance lesson plans, as well as how directly relating material to Nevada will further engage students.*
- *Show them interactive lesson plans that can be used on the computer. Use of updated technology.*

Student Impact

- *I believe that the results for students will be similar to that of the teachers. The impact should be nearly the same, with the exception that the prior knowledge of students is most likely different.*
- *To use technology to learn about their environment in new and better ways.*
- *Increase their knowledge of geology and climate change.*
- *Learning, self-regulation, understanding of climate change from a local to global.*
- *Students will be impacted by recognizing that climate change is occurring in their backyard, not only in other places across the globe. This should enhance their level of engagement with the topic as well as increase awareness of climate change.*
- *Understand how geology contributes to current climate knowledge. Increased development of logical thinking processes.*

Commendations and Recommendations

Curriculum developers are commended for having a research-based lesson-design and a well-documented curriculum development process.

1. Developers are encouraged to create a plan outlining when/if future lessons will be developed and implemented. If future lessons are planned, the evaluator should be included in development of the formative and summative assessments. The project lead is encouraged to work with the evaluator so that evaluation measures can be developed to assess curriculum implementation and the achievement of project goals from year to year.

2. The assessment plan delineated on the project website should be carried out and results should be provided to the external evaluator to be included in upcoming reports.

3. A link to the UNLV Climate Change Education website should be posted on the Nevada EPSCoR website under a *Curriculum* tab.

4. Curriculum developers need to create a dissemination plan that explains how they will share their lesson(s) with other teachers, schools, and districts.

C. New Mexico Educational Materials Development program

Background

The primary goals of the **New Mexico educational materials development** program are to develop middle and high school curricula relating to climate change, water resources, and the science, technology, engineering and math (STEM) pipeline that prepares students for studying those areas and to distribute those materials around the state. Materials are available at http://nmepscor.org/content/teaching-materials.

Assessment development and data collection methods

The external evaluator used the educational materials development evaluation form (Appendix A) with this project that was used with the Idaho and Nevada projects to assess the curriculum development process, the quality of the education materials, and the expected impact of the materials on teachers and students. The evaluator posted the evaluation form online at www.zoomerang.com and emailed a link to the project leader who then emailed the link to the curriculum developers. Three reminders were sent from the project leader to the curriculum developers to complete evaluation form.

Evaluation Participants

The primary participants are nine New Mexico Institute of Mining and Technology also called New Mexico Tech (NMT) Masters of Science Teaching (MST) students. These students are all professional teachers of middle and high school students working towards a Master's degree in teaching. As a culmination of their work at NMT, students create a science-based curriculum. Project coordinators work with the MST students interested in developing EPSCoR-related curricula. Students start their Independent Studies to develop the curriculum at various times throughout the year and usually take about a year to complete them. Figure 5 shows the current NMT materials development team.

Figure 5. New Mexico educational materials development team

Name	Position	Affiliation	Email
Theresa Apodaca	MST student	NMT	tapodaca@socorro.k12.nm.us
Jerry Esquivel	MST student	NMT	jlesquivel@cepinm.org
David Hailes	MST student	NMT	dhailes@nmt.edu
Leigh Hedderman	MST student	NMT	leigh.hedderman@gmail.com
Martha Holmen	MST student	NMT	mvholmen@gmail.com
Ashley Ivins	MST student	NMT	nmcanchaser@gmail.com
Jared Kempton	Computer science staff	NMT	nicomarrero@gmail.com
Margaret Lewis	MST student	NMT	mlewis34@hotmail.com
Valerie Salas	MST student	NMT	v_salas@yahoo.com
Alvin Suazo	MST student	NMT	Alvin.suazo@state.nm.us

Of the nine curriculum developers participating in the project, six completed the evaluation form. The majority of respondents were Caucasian (83%), female (83%) middle/high school teachers (100%). Six institutions were represented among curriculum developers and most developers have been working with the educational materials development team six months or less (83%). A list of demographics is shown in Figure 6.

Figure 6. Demographic description of New Mexico curriculum developers

	Pre-survey (n=6)	
	#	(%)
Gender		
Female	5	83%
Male	1	17%
Ethnicity		
Caucasian	5	83%
Hispanic	1	17%
Role[3]		
Middle/High School Teacher	6	100%
Master's Degree Student	4	67%
Program Administrator	1	17%
Institution[4]		
Bernalillo High School	1	17%
Cimarron High School	1	17%
Sarracino Middle School	2	33%
TLC Charter school	1	17%
Volcano Vista High School	1	17%
Years working on the educational materials development team		
6 months or less	5	83%
7-12 months	1	17%

Evaluation findings

Curriculum development process

Curriculum developers were asked about the process they used to develop, test, and refine the educational materials. They most frequently commented that they refine their materials based on feedback from students in previous classes. Below is the full outline that they each reported utilizing in developing their curriculum:

- *I first identified an area of need (interdisciplinary climate science materials) and then developed or researched activities around the Big Idea of the Earth as a System of interacting spheres. I tested the materials with my students and have made corrections and improvements based on their feedback.*
- *I make the lesson plans, then use them with my classes.*
- *I started a water quality study with my 6th grade students 4 years ago. So every year I have been able to use what worked in the past and refine the lessons and activities.*
- *field testing with students/ trial and error/ feedback from students*
- *I modify activities that I originally developed in my classroom.*

Developers explained if the lesson planning followed a specific research-based lesson plan process. Based on the follower comments, each curriculum developer uses a different source of research-based lesson plans to develop their curriculum. Their comments are below:

- *The lessons follow the Focus-Explore-Reflect-Apply learning cycle described by the National Science Resources Center*
- *5e model- commonly used by many sources/organizations- BSCS, NASA, etc.*
- *Backwards design. Project based Learning.*
- *I have used different sources in guiding what I teach and how to teach. For example I have used articles on teaching outdoor science from Science News, a summer 2010 edition, and Middle Ground, a magazine from Association for Middle School Education.*
- *I don't know what it is.*

[3] Percentages do not equal 100 because some people selected more than one response.
[4] Percentages do not equal 100 due to rounding.

Developers described materials they have developed during the curriculum planning process. They most frequently reported developing lesson plans and specific classroom assignments.

- *I have developed four modules for a semester-long high school science elective course. The title of the course is Climate & Water - Earth System Interactions in the Southwest. General topics include spheres of the earth system, the water cycle, the carbon cycle, and climate. The modules are word documents that include web activities, lab experiments, and field work. Student work is primarily through low-stakes written reflection and oral discourse following activities.*
- *I have developed a semester curriculum with daily lesson plans for high school students.*
- *The topic is energy which includes discussion of alternative energy resources and as well as current energy sources. Global climate change as a result of our energy use is also included. General energy basics and power generation are also part of the semesters lessons.*
- *I have developed 9 lessons and assignments for a unit on using water quality techniques to study Rio Grande salinization for middle school students.*
- *robotics/environmental monitoring- testing different methods of teaching concepts of robotics to see what works best- intended audience 7-12th grade students*
- *1 construction/Research Project applying Physics to Green Energy.*

Developers explained how the materials will be used by teachers with students and in what type of learning situation.

- *These modules will be hosted on the NM EPSCoR website for teachers to use as they wish. I plan to use them in my public high school courses in the future. They could also be used in a full-online program.*
- *I am currently using the lessons as I develop them with my students at TLC Charter school.*
- *Since I have been developing these lessons for distance delivery that is wide open on who will use them. I will share them with my colleagues when I have completed the unit, hopefully on the school's website.*
- *science, robotics or elective courses or after-school programs during the school day or extracurricular could also be used by clubs or organizations*
- *Physical Science classroom from middle school through college. Application of physics concept to solve energy concerns by the production of Renewable Green Energy.*

When asked whether sufficient support and guidance was received from program leaders responses were mixed:

- *Yes, I was provided with general course requirements for building an online course. Staff has answered questions and addressed concerns I've had along the way. I have attended two EPSCoR All-Hands meetings and I was given the opportunity to present my work at an informal working group last summer.*
- *Yes, I have gotten feedback on how to make my lesson plans and assignments better.*
- *This is my first opportunity to work in this program. I am working through a steep learning curve. I am receiving adequate instruction.*
- *I haven't gotten any support or guidance from the program leaders. I have not submitted any of my lessons to them yet.*
- *Honestly I've felt a little lost- not really sure exactly what the expectation is for what I develop.*

Curriculum developers made the following suggestions to improve the educational materials development program:

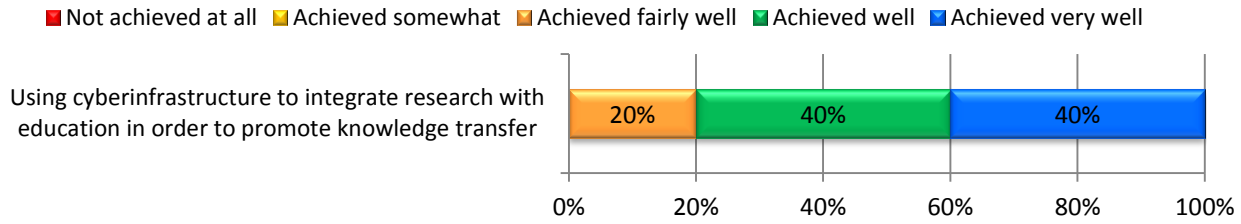
- *The course requirements provided seem to be related specifically to University online courses. I think the structure could be tailored more to curricula that will be housed on the web but not necessarily used as a complete course. I also suggest that there be a review committee to provide the developer with feedback specific to the content of his/her materials.*
- *I am trying to incorporate some of the EPSCoR data bases into my lessons but am having difficulty getting into them and getting them in a format I can use.*
- *The process is simple so I don't know how it can be improved at this time.*
- *Sample lessons/units would be great to see.*
- *With usage in the field and modification by those who use it to me their needs.*

Achievement of project goals

As stated previously, the primary goal of the cyberlearning portion of the Track 2 EPSCoR project is to use cyberinfrastructure to integrate research with education in order to promote knowledge transfer. Curriculum developers rated on a scale of 1-5 (1=not at all, 5=achieved extremely well) how well they think this educational materials development program is achieving this goal. Eight (80%) rated goal achievement as a *5, achieved extremely well* and two (20%) rated goal achievement as a *4, achieved fairly well.*

Curriculum developers rated their goal achievement of using cyberinfrastructure to integrate research with education in order to promote knowledge on a scale from 1-5, 1=*not at all*, 4=*achieved extremely well*. The percentage of ratings for curriculum developers is shown in Figure 7.

Figure 7. Curriculum developers' ratings of achievement of project goal



When asked to explain their ratings of project goal achievement, curriculum developers made the following comments:

- *I have learned the difference of writing curriculum for distance delivery compared to delivering a lesson in the classroom. It's cool that what I have taught in the classroom the past 4 years can actually be written for cyberlearning.*
- *My materials are directly related to this topic*
- *The research part of the project confirms the need to move away from fossil fuels in a cleaner renewable source of energy. The project then produces a example of green energy.*
- *I integrate climate change into this semester class but water resources are covered in the 1st semester of the class. I am not developing materials on water resources for my Independent Study. I am trying to integrate cyberinfrastructure into the lessons but am having problems with the database format for high school student use.*
- *I don't feel I have enough information to answer this question. I haven't seen the other materials that have been developed. I believe that the newly formed Teacher Advisory Panel will help in the achievement of this goal.*

Impact of curriculum materials development project

Curriculum explained the impact they believe this project will have on them professionally as well as the impact it will have on teachers and students. Comments for each area are listed below.

Personal Impact

- *The experience has been incredibly rewarding; meeting scientists and educators at the EPSCoR meetings has opened my mind to many possibilities for improving science education by making lessons relevant to local and global issues, such as climate change. I've become more comfortable with presenting my views and ideas in a public forum. My knowledge of science content and pedagogy has grown enormously as a result of researching and writing these materials.*
- *I started this in Aug. and developing lessons as definitely improved my teaching.*
- *It has helped me focus on the importance of water quality and tying that into the standards and benchmarks.*
- *I've always been very interested in instructional materials development so was happy to have the opportunity*
- *I have been able to share with a larger group.*

Teacher Impact

- *I hope teachers will find the FERA learning cycle with low-stakes writing activities to be an effective teaching strategy.*
- *I think they will make studying energy easier for the classroom teacher to use lessons which I have already tried out on my students.*
- *I would like the teachers to understand that water is an important topic to teach and can be fairly simple to teach and learn with children.*
- *A way of integrating robotics into the content of science, even with little or no experience with robotics*
- *It will provide a hands-on application of Physics concepts to the creation of examples of green energy producers.*

Student Impact

- *My primary goal for the materials is to increase the student's environmental literacy regarding water and climate issues.*
- *These lessons will make energy more interesting to students and they will also understand energy at a much deeper level.*
- *I would like the students to learn about the issues of water quality and what can be changed so that something can perhaps be done about it.*
- *Excite them about using engineering to explore science*
- *The students will gain confidence in their ability to use concepts of physics to impact real world issue.*

Commendations and Recommendations

Curriculum developers are commended for developing climate change curriculum for secondary schools.

1. There does not seem to be a specific process which the curriculum developers follow to develop their curriculum and materials. Encourage developers to identify a specific step by step process on how they will develop and implement the curriculum starting with a research-based lesson planning process. Consider working with the Nevada and/or Idaho curriculum developers to identify and utilize a successful curriculum development process.
2. Teachers seem to be working on curriculum development independently from each other. Establish one person to lead the curriculum development effort and encourage NMT students to work together as a collaborative on curriculum development. Working in a collaborative will also give them the opportunity to give and receive feedback and share ideas even if they are working on different curricula.
3. As stated in the 2011 Q3 report, it is important that curriculum is aligned with New Mexico and national science and climate change standards and standardized tests. To demonstrate this alignment, standards that are being addressed should be clearly stated in the description of each lesson. When materials are placed online they should be searchable by standard addressed and by topic.
4. As stated in the 2011 Q3 report, formative and summative evaluation plans and tools should be developed and implemented to track the progress and success of the curriculum development program.

D. New Mexico Growing up Thinking Scientifically (GUTS) Student Program

Background

Growing up thinking scientifically (GUTS) means learning to look at the world and ask questions, develop answers to the questions through scientific inquiry, and design solutions to their problems. Project GUTS (www.projectguts.org) is a summer and after-school science, technology, engineering and math (STEM) program for middle school students. It was designed to be a feeder program for the Supercomputing Challenge. The primary participants of GUTS are middle school students, their teachers, and volunteers from academia and industry. Teachers form GUTS clubs at their schools and interested students join. Project GUTS is a year-round program. There are four main components/activities of the GUTS program:

- **Student Round-ups** - Conducted in June/July
- **Summer Teacher's Institute** (STI) - Teachers attend classes at New Mexico Tech and learn computer modeling and how to help their students with their modeling projects.
- **Roundtables** - Conducted at the end of each semester in which teams present and discuss.
- **Supercomputing Challenge Expo**. – Students attend this end-of-year culminating event.

Assessment development and data collection methods

Pre and post-surveys were developed by project leaders however; the GUTS pre-survey was not conducted because the Institutional Review Board Protocol (IRB) was not in place. Demographic information of student participants was collected on the application form.

Project participants

During the 2011-12 project year, the Track 2 EPSCoR funded six new Project GUTS teams. Figures 8 shows the demographic description of new GUTS participants. Fifty-five new students joined Project GUTS, the majority of whom are in the 7th grade (56%). Slightly more female students (56%) than male students (44%) joined. Considerably more underrepresented minorities[5] (75%) joined Project GUTS than non-underrepresented minorities.

Figure 8. Newly funded 2011-2012 GUTS teams

	Total # participants	Male		Female		Grade 6	Grade 7	Grade 8	Grade 9
Fall 2011		**URM**	**Non-URM**	**URM**	**Non-URM**				
Aspen Comm. Magnet School	7	3	1	3	0	0	7	0	0
DeVargas MS	19	10	2	7	0	0	19	0	0
GUTS y Girls Alumnae Club	12	0	0	7	5	0	5	3	4
Gonzales Community School	4	3	1	0	0	4	0	0	0
Sarracino MS	6	0	0	3	3	3	3	0	0
West Las Vegas MS	7	3	1	2	1	2	2	2	1
Total	**55**	**19**	**5**	**22**	**9**	**9**	**36**	**5**	**5**

[5] Underrepresented minority (URM) includes Hispanic, African American, and Native American students

Evaluation Findings

The evaluator worked with the project leaders to complete and submit the IRB protocol. The IRB was approved too late to conduct the pre-survey therefore not additional findings are available.

Commendations and recommendations

The New Mexico GUTS program is commended for developing a project for middle school students that allows them to use computational thinking and computers to analyze, model and solve real-world problems. The project is also commended for its continual expansion to new schools and districts.

1. Pre-and post-surveys have been developed but have not yet been implemented. The evaluator will review surveys and will work with the program leaders to develop program goals and refine surveys to ensure they collect three types of information:
   - Demographic characteristics of students such as ethnicity, grade point averages, qualification for free/reduced lunch and special programs.
   - Program evaluation information to assess the quality and usefulness of program activities and components.
   - Program goal achievement. Program leaders should identify 2-5 project goals and design survey questions to measure achievement of those goals.

2. Demographic information of teachers and volunteers from academia and industry is not collected and formative and/or summative evaluations are not conducted. Develop and administer an annual post-survey of all adults involved in the program. Include questions about participant demographics, evaluation of program components, and achievement of program goals. The evaluator will assist program directors to develop a teacher/volunteer post-survey.

E. New Mexico Super Computing Challenge (SCC) Program

Background

The main goals of the **Supercomputing Challenge** program (www.challenge.nm.org/) are to teach computational thinking in science and engineering to high school students. Students learn how to use computers to analyze, model, and solve real-world problems. Each SCC team has mentors that provide support and answer questions throughout the year.

Teams participate in the following activities throughout the year:

- **Summer Teacher's Institute** (STI) - Teachers attend classes at New Mexico Tech and learn computer modeling and how to help their students with their modeling projects.
- **Summer Roundups** - Workshops are given locally for teams and teachers on an as-needed basis. These workshops teach computer modeling, how the challenge works, and other materials to both students and teachers. Round-ups enable teachers who are unable to attend STI to receive professional development and host a team.
- **Kickoff** – Student teams participate in introductory classes at New Mexico Tech on programming, modeling, data analysis, and other topics related to the SCC.
- **Proposals** - Teams write a proposal for a project that is reviewed and commented on by members of industry and academia
- **Interim Reports and Evaluations** - Teams write up their progress about halfway through the year. The teams travel to a local college and present their current work. These presentations and reports are also reviewed and commented on by members of industry and academia and suggestions are given to help the teams and/or their projects and point out areas to focus on to help them complete their projects.
- **Final Reports** - Teams write up a final report at the end of the year. The final reports are judged to determine finalists but feedback is given to all the teams.
- **SCC Expo** at Los Alamos National Lab – To culminate the year teams present their work to panels of judges and receive feedback on their presentations and reports. Awards, scholarships, and prizes are given.

During the 2011-12 project year, NM EPSCoR funded three new Supercomputing Challenge teams. EPSCoR funding allowed these schools to start their first SCC teams by sending teachers to the Summer Teachers' Institute, hosting a Summer Roundup, and sending teachers and students to the Kickoff. Figure 9 shows the newly funded Fall 2011 SCC teams. A little over half (58%) of participants are male, non-underrepresented minority (67%).

Figure 9. Newly funded 2010-11 Supercomputing Challenge teams

	Total # participants	Male		Female	
Fall 2011		**URM**	**Non-URM**	**URM**	**Non-URM**
Alamogordo High School	4	0	4	0	0
Mesa Middle School	3	1	1	1	0
Rio Rancho Cyber Academy	5	1	0	1	3
Total	**12**	**2**	**5**	**2**	**3**

Assessment development and data collection methods

A pre-survey (Appendix B) was developed by SCC project leaders to establish a baseline assessment of students' knowledge and ability with utilizing technological tools and computing programs to complete various tasks. It also asked questions pertaining to how students learned about SCC and why they decided to join. The pre-survey was posted on-line at www.surveymonkey.com and a link to the survey was posted on the SCC webpage. At the beginning of the 2011-12 academic year project leaders asked all SCC students (including those who are not funded by EPSCoR) to go online and fill out the pre-survey. All students' pre-survey responses are included in this report.

Evaluation Participants

According to information obtained from the SCC project leader, over 400 students registered for the 2011-12 Supercomputing Challenge. Of the 400+ students, 234 completed the evaluation form sent at the beginning of the academic year. Almost twice as many males than females registered in the SCC program (65%) and the majority of students are in in high school (75%). Over 57 middle and high schools were represented among SCC participants. Among middle schools, Picacho Middle School has the most students in the program while The ASK Academy has the most high school students participating. A full list of number and percentage of students, by gender, grade level, and school, is shown in Figure 10.

Figure 10. SCC student demographic information

	SCC Students (n=234)	
	#	(%)
Gender		
Male	152	65%
Female	82	35%
Grade level		
5th grade	8	3%
6th grade	26	11%
7th grade	23	10%
8th grade	34	14%
9th grade	34	14%
10th grade	25	11%
11th grade	41	17%
12th grade	42	18%
Did not indicate	3	1%

	SCC Students (n=234)	
	#	(%)
School		
Ahrens	1	<1%
AIMS@UNM	3	1%
Alamogordo High School	4	2%
Albuquerque High School	3	1%
Aldo Leopold High School	2	1%
Alvarez	1	<1%
Artesia High School	4	2%
Aspen Elementary School	15	6%
Badilla	1	<1%
Bernalillo High School	3	1%
Bunche Charter School	1	<1%
Caulfield	1	<1%
CEPI1	7	3%
Chaparral High School	3	1%
Chaparral Middle School	3	1%
Desert Academy	7	3%
Down To Earth School	6	3%
Edgewood Elementary School	7	3%
Edward A Ortiz Middle School	1	<1%
Escalante High School	2	1%
Espanola Valley High School	1	<1%
Freedom High School	7	3%
Grants High School	5	2%
Highland High School	1	<1%
Home School	1	<1%
Jackson Middle School	13	5%
La Cueva High School	3	1%
Las Cruces High School	5	2%

	SCC Students (n=234)	
	#	(%)
Little Earth School	1	0.4
Lohmeier	1	0.4
Los Alamos High School	7	3%
Los Alamos Middle School	13	6%
Manzano High School	5	2%
Mayfield High School	1	0.4
Melrose	1	0.4
Mesa Middle School	6	2%
Miyamura High School	4	2%
New Mexico School for Arts	3	1%
Onate High School	1	0.4
Picacho Middle School	24	10%
Pinon Elementary School	1	0.4
Quemado Schools	1	0.4
Rio Rancho Cyber Academy	2	0.8
Robertson High School	4	2%
Sandia Prep	1	0.4
Santa Fe High School	6	3%
Sarracino Middle School	1	0.4
Sarricino High School	1	0.4
School of Dreams Academy	8	3%
Shiprock High School	2	1%
Sierra Middle School	2	1%
Socorro High School	9	4%
St. Pius X High School	3	1%
The Academy for Tech/Classics	4	2%
The ASK Academy	10	4%
Early-College Charter HS	2	1%
V. Sue Cleveland High School	1	0.4

Evaluation findings

Students responded to two open ended items. The first question asked how students learned about the Supercomputing Challenge. Six different information resources were mentioned. The information resource mentioned most frequently was through a teacher, mentor or sponsor. A chart of the information resources and the number of comments per resource are shown in Figure 11.

Figure 11. How students' learned about Supercomputing Challenge

Theme	Number of comments	Example
Teacher/mentor/sponsor	102	• *My teacher has been taking students for many years. He introduced me to programming and the challenge.* • *I learned about the Supercomputing challenge through my favorite principal Ms. Leanne.*
School/programs /announcements	55	• *From my school, I learned about it three years ago, but never joined until this year.* • *I learned about the challenge through posters and announcements at Los Alamos Middle School*
Friends	33	• *From my friends who did it last year.* • *My friend kept on telling me about supercomputing*
In SCC/GUTS last year	21	• *I learned about the SCC during a GUTS meeting.* • *In my AP Computer Science Class.*
Parents/siblings	19	• *I learned about the supercomputing challenge from my sister who did it a year ago.* • *YWIC sent a link to my mother.*

Students also explained why they chose to participate in the Supercomputing Challenge. Nine common themes emerged among responses. Themes and the number of comments per theme are shown in Figure 12. All students' responses can be found in Appendix C.

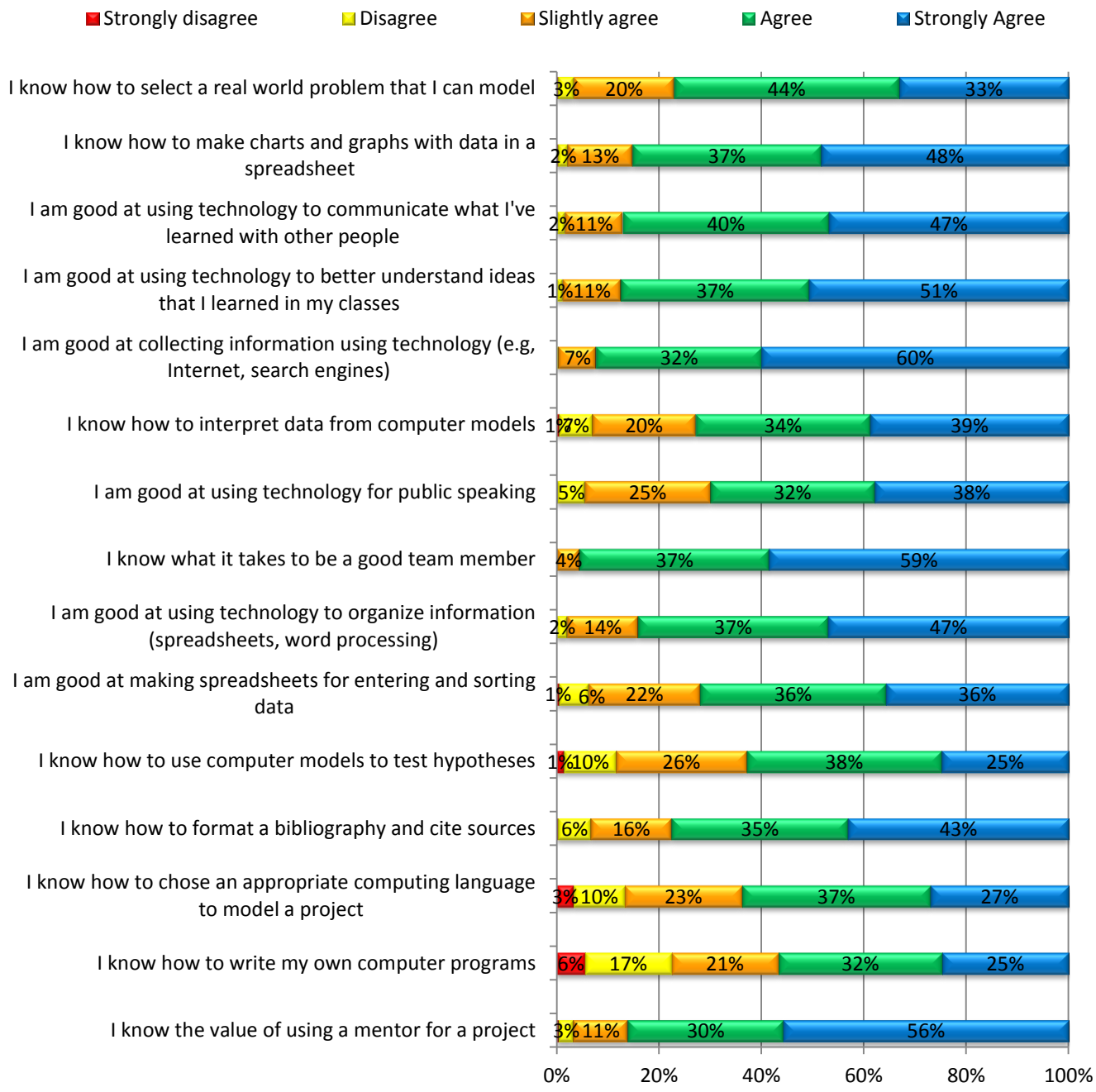
Figure 12. Students' reasons for participating in the Supercomputing Challenge

Theme	Number of comments	Example
Learn programming, computer languages, gain understanding of how computers work.	67	• *To learn more programming* • *To learn more about computing and fundamentals of computer science*
Sounded like fun	39	• *I love to work with computers, so I put that motivation to good use* • *Because it sounded like fun, and I was offered the challenge especially. I also like to show off!*
For the challenge, competition, and experience	33	• *To get involved in an activity that pressures me to do my best* • *For the experience of competing, other than a sports challenge*
Prior experience in SCC/prior programming coursework	25	• *I've done it for the past two years and loved it.* • *I have participated in the last two years of the Challenge and hope to do better than we did last year.*
To prepare for college/get a scholarship/ enhance resume	17	• *I am interested in further education in computer science.* • *To get a scholarship to help me in my starting years of college.*
Teacher recommended	14	• *My Bio-medical teacher recommended it to my group and me.* • *My teacher wanted several students to be involved interesting.*
To meet new people and be part of a team	12	• *I want to bring my own experiences with a group of other motivated individuals and build a computer simulated program.* • *I love computer science and this challenge is a great way to meet others as interested in CS as I am.*
Required for class/grade requirement	6	• *It's required for my computer class.* • *Part of my grade for a computer science class.*
Interested in science as a future career	5	• *I love programming and will become a programmer in the future..* • *I plan to go into a career as a programmer.*

Impact of the program

SCC students responded to pre-survey questions to assess their ability to utilize technological tools and computer programs to complete various tasks on a Likert scale from 1-5, 1=*strongly disagree* to 5=*strongly agree*. The majority of students either *agreed* or *strongly agreed* with each of the statements. The lowest levels of agreement were with statements related to use of computer models, spreadsheets, computing languages and writing computer programs. Results are shown in Figure 13.

Figure 13. SCC students' ability to use educational tools



Commendations and Recommendations

The New Mexico SCC is commended for developing a project for middle and high school students that allows them to use computational thinking and computers to analyze, model and solve real-world problems. Students are passionate about the program. The project is also commended for the wide range of methods used for advertising and garnering extremely high levels of participation. The program continues to expand each year.

1. The majority of student participants are male, Caucasian. Encourage more female and underrepresented minority students to participate by personally inviting them to join the challenge. While participating in SCC, continue to encourage female and underrepresented minority students to take computer science related classes and pursue higher education and a career in a field related to computational thinking.

2. Additional demographic information of students such as ethnicity, grade point averages, qualification for free/reduced lunch and special programs should be collected in the pre and post-surveys to ensure that attrition (if any) is equal across all groups. Program evaluation questions should be included in the post-survey to assess the quality and usefulness of program activities and components. Pre/post surveys should be aligned with program goals. Program leaders should identify 2-5 project goals and design survey question to measure achievement of those goals. The evaluator will work with the SCC program leaders to refine demographic and formative sections of the pre/post surveys. The evaluator will also assist project leaders develop program goals and identify questions that measure achievement of those goals.

3. Demographic information of teachers and volunteers from academia and industry is not collected and formative and/or summative evaluations are not conducted. Develop and administer an annual post-survey of all adults involved in the program. Include questions about participant demographics, evaluation of program components, and achievement of program goals. The evaluator will assist program directors to develop a teacher/volunteer post-survey.

F. New Mexico CI for Industry

Background

The mission of **CI for Industry**, commonly referred to as **Fast Forward New Mexico** (FFNM), is to increase statewide broadband adoption and promote computer literacy and Internet use in rural, Hispanic, and Native American communities in order to better prepare the state's citizens to participate in economic development and educational opportunities.[6] The initiative also reaches out to small businesses and entrepreneurs. Currently Fast Forward New Mexico is serving twenty communities. Track 2 EPSCoR funding provides computer training in three communities:

- Silver City – General audience English-speaking communities
- Crownpoint – Navajo communities
- Espanola/Ohkay Owingeh Pueblo –Spanish-speaking and Native American communities

During this reporting period FastForward New Mexico implemented the following activities in the three Track 2 EPSCoR-funded communities:

- Conducted 24 computer training classes
- Hosted two Cyberinfrastructure guest speakers
- Conducted four case studies
- Initiated collaborations with small business owners

Computer Trainings

A total of 24 trainings were offered during the current reporting period: Twelve classes in Silver City, eight classes in Crownpoint and four classes in Espanola/Ohkay Owingeh Pueblo. A description of the number of participants, classes offered, and total hours are shown in Figure 14.

Figure 14 Computer trainings offered by FFNM

	Silver City – General audience	Crownpoint – Navajo communities	Ohkay Owingeh Pueblo and Spanish speaking communities
	#	#	#
Participants	118	115	25
Classes	12	8	4
Total hours	708	690	150

Assessment Development

FFNM developed pre and post-surveys to assess the quality of their presentations and the impact of their trainings. They developed three different pre/post survey versions:

- General audience (Appendices D and E)
- Navajo communities (Appendices F and G)
- Spanish-speaking communities (Appendices H and I),

[6] FFNM webpage - http://www.fastforwardnm.org/

Each of the three survey versions is slightly different and pre- and post-surveys are slightly different from one another. Therefore, it was a challenge to compare information between groups or show meaningful gains from pre- to post-surveys.

Data Collection

At the beginning and completion of each training, participants were asked to go online at the training lab and complete the pre- and post-surveys. A total of 398 participants completed pre-surveys and 279 completed post-surveys. Figure 15 shows the number of participants who responded to each version of pre-and post-surveys. A large number of participants completed the general audience survey while relatively few completed the Navajo and Spanish speaking pre and post-surveys.

Figure 15. Response rates to FFNM surveys

	Silver City – General audience	Crownpoint – Navajo communities	Ohkay Owingeh Pueblo and Spanish speaking communities
Pre	347	31	20
Post	247	16	16

Evaluation participants

Sample sizes are indicated for each question to show the number of respondents who answered that specific question, as not all questions were asked in all surveys. Demographic questions were included in the pre-survey only. The majority of participants learned about the trainings through the library (n=137), make less than $10,000/year (31%), are 61 years or older (59%), have no children living in the home (37%), and currently have internet access in their homes (68%). A full description of demographics is listed in Figure 16.

Figure 16. Demographic description of FFNM survey respondents

	Pre-survey Responses	
	#	(%)
How did you learn about this training (n=398)		
Library	137	34%
Newspaper	114	29%
Word of mouth or a friend told me	62	16%
Community agency or public organization	43	11%
Place of employment	31	8%
Poster or flier/brochure posted around town	18	5%
Radio	16	4%
Other	39	10%
Annual income (n=42)		
Less than $10,000	13	31%
$10,000-$25,000	16	38%
Over $25,000	13	31%
Age (n=22)		
31-45 years old	2	9%
36-60 years old	7	32%
61 years or older	13	59%

	Pre-survey Responses	
	#	(%)
Number of children in the home (n=43)		
0	16	37%
1	10	23%
2	13	30%
3	1	2%
4	3	7%
Internet access in your home/business? (n=20)		
Home	13	68%
Business	6	35%
Field of work (n=27)		
Art	5	19%
Farming and ranching	3	11%
Jewelry or clothing making	5	19%
Performance	2	7%
Small farm	2	7%
None of the above	10	37%

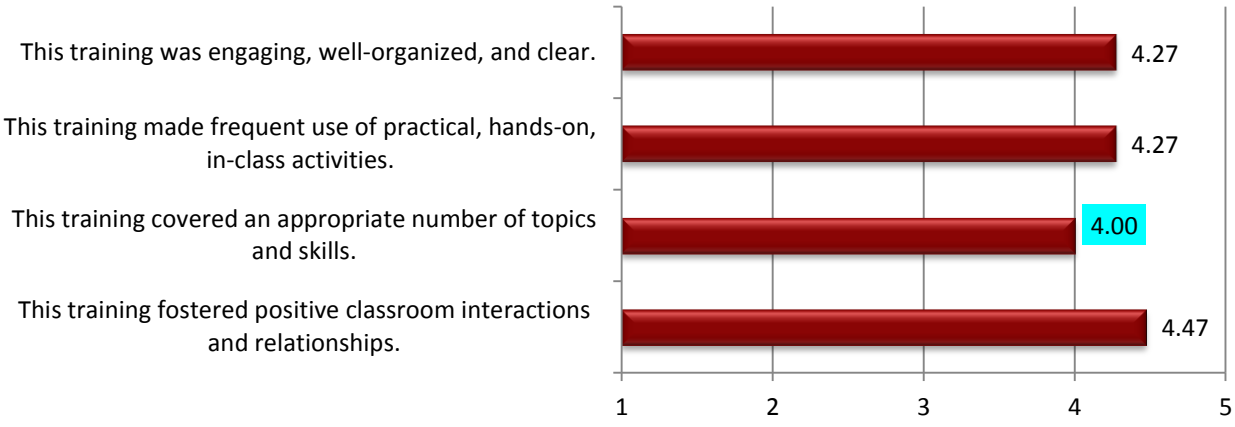
Evaluation Findings

Evaluation of project components

Questions to assess the quality of the training and the presenter were included only on the general audience and Spanish-speaking post-survey. Only fifteen people completed this section of the post-surveys. Participants rated the quality of the computer trainings they received on a Likert scale from 1 to 5, 1=*disagree strongly*, 5=*agree strongly*. The majority of participants rated each of the training components as *good* to *excellent.* Mean ratings are shown in Figure 17. Means can be considered to trend towards positive or negative based on the following scale:

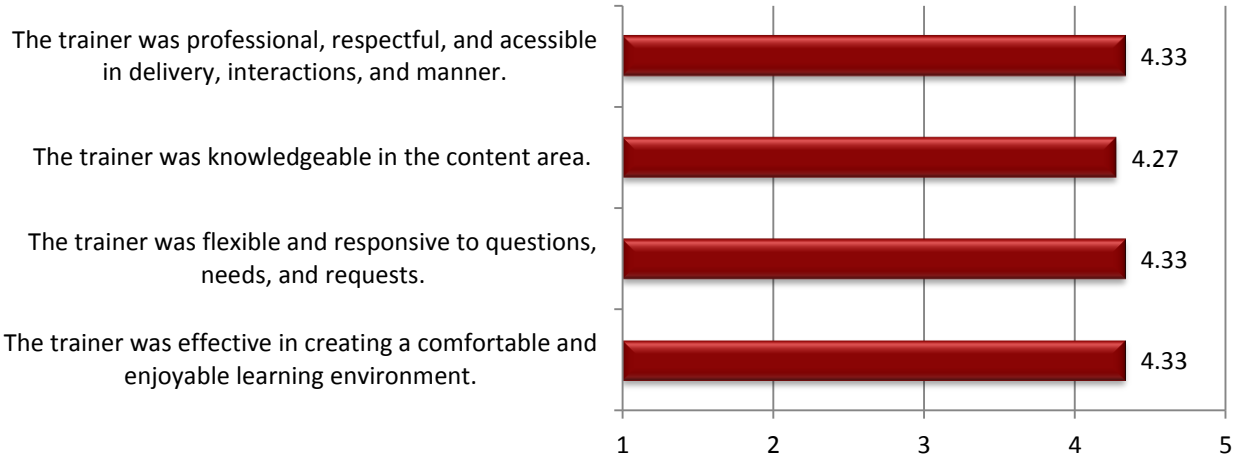
Excellent	4.21 – 5.00
Good	3.41 – 4.20
Average	2.61 – 3.40
Below average	1.81 – 2.60
Poor	1.00 – 1.80

Figure 17. Respondents' ratings of quality of FFNM trainings



Participants rated the quality of the trainer who conducted the computer trainings on a Likert scale from 1 to 5, 1=*statement is not very true*, 5=*statement is very true.* The majority of participants rated the trainer on each of four components as *good* to *excellent.* Mean ratings are shown in figure 18.

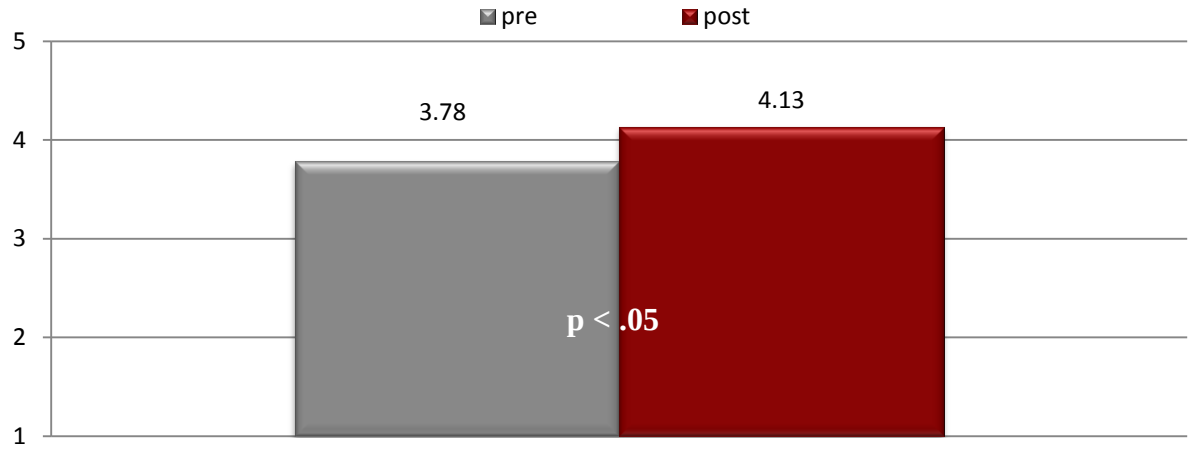
Figure 18. Respondents' ratings of quality of FFNM trainers



Impact of participation in the training

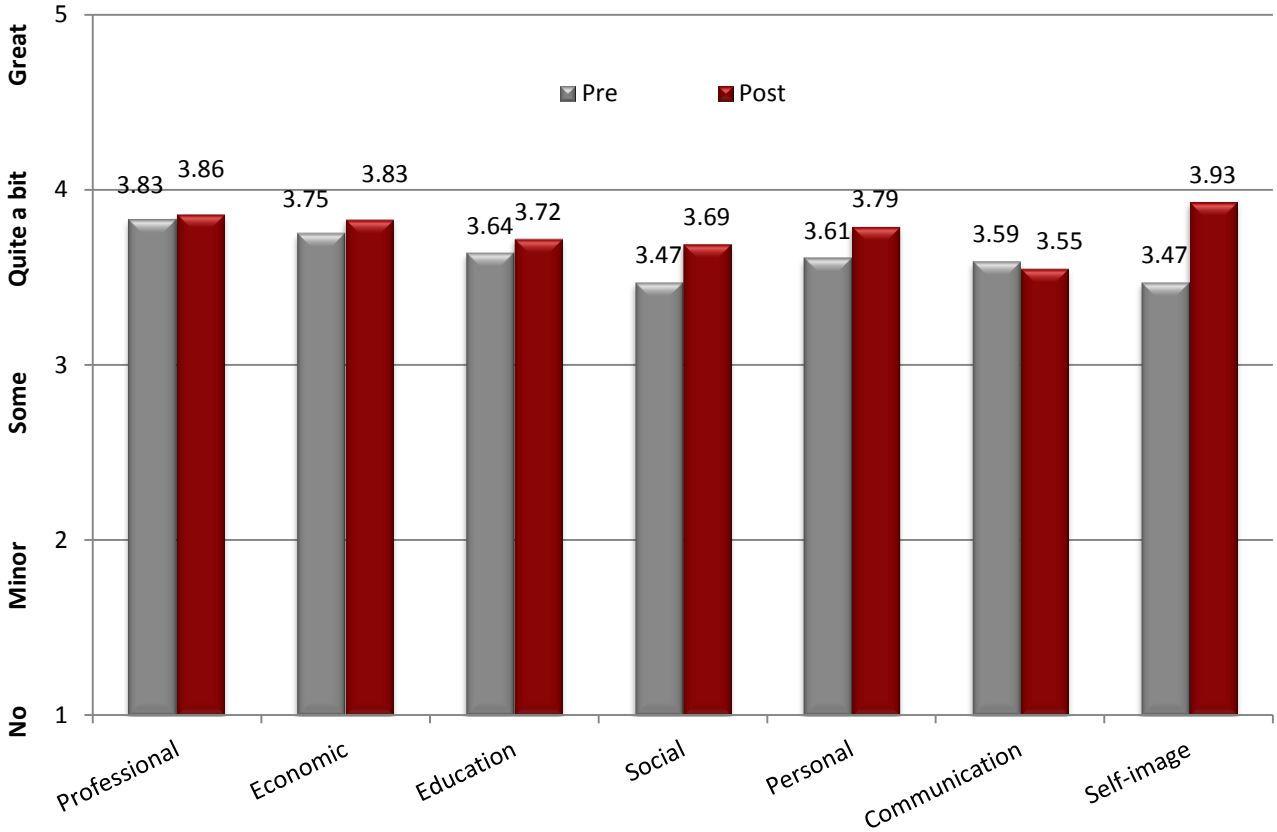
All pre/post-surveys included questions to assess participants' knowledge, ability and confidence in using basic computer operations. Respondents rated themselves on a Likert scale from 1-5, 1=*disagree strongly* to 5=*agree strongly* as they believed themselves to be before and after participating in the trainings. The evaluator conducted a paired samples t-test to assess pre- to post-survey differences that may be attributed to participation in the computer trainings. A p-value less than .05 is considered statistically significant. Significant gains were found from pre- to post-survey scores suggesting that the trainings improved participants' knowledge, ability, and confidence in using basic computer operations. Results are shown in Figure 19.

Figure 19. FFNM survey respondents' knowledge, ability and confidence in using computers



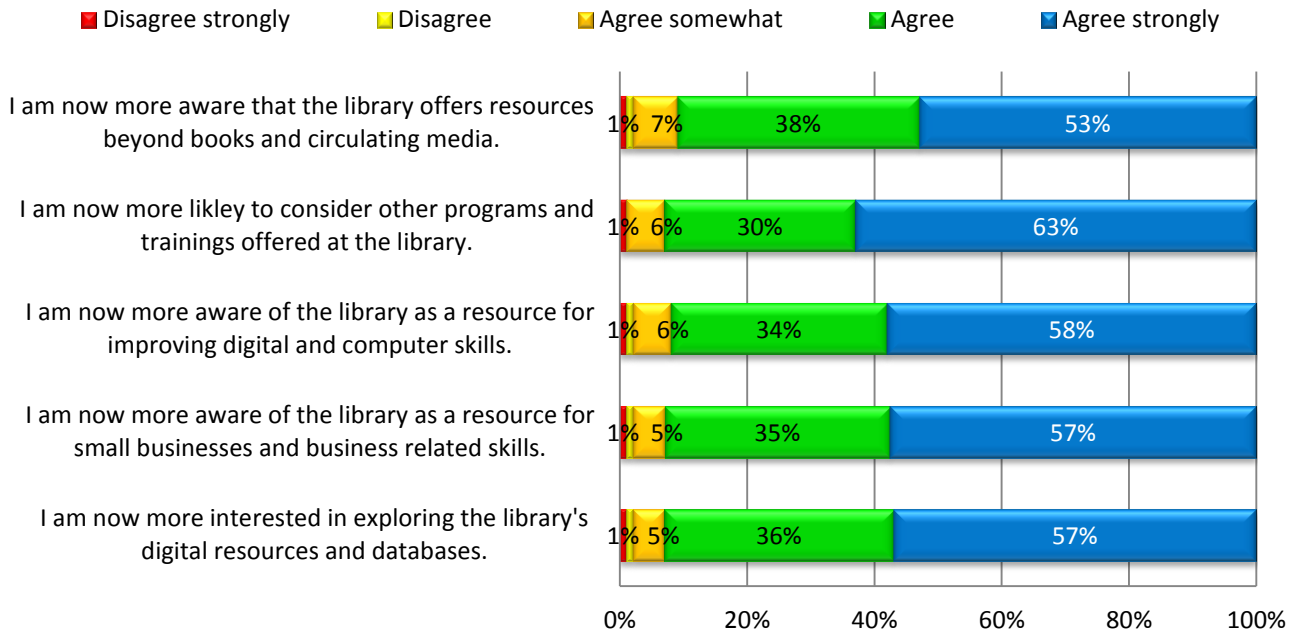
Participants also completed pre- and post-survey questions to assess in what areas of life they consider computer skills to be important on a Likert scale from 1-5, 1=*no significance* to 5=*great significance*. The evaluator conducted a paired samples t-test to assess pre- to post-survey differences that may be attributed to participation in the computer trainings. A p-value less than .05 is considered statistically significant. Although participants' attitude toward the importance of computer skills increased in six out of seven areas, none of the gains showed statistical significance. The area of self-image (These skills affect my sense of independence confidence, or relevance) showed the greatest increases. Pre- and post-survey mean ratings are shown in Figure 20. On average, at both pre- and post-survey, participants believe computer skills to have between *some* to *quite a bit* of importance.

Figure 20. FFNM survey respondents' average ratings of importance of computer skills



Participants rated their knowledge about the local public library on a scale from 1 to 5, 1=*disagree strongly*, 5=*agree strongly* after participating in the trainings. The majority of participants reported being more aware of what the library has to offer and being more interested in exploring the library's resources. Mean ratings are shown in Figure 21.

Figure 21. FFNM survey respondents' knowledge about the public library



Commendations and Recommendations

The CI for Industry project and Fast Forward New Mexico are commended for the number of trainings that have been held and the number of people reached. Participants rated trainings as very useful and beneficial to their lives. Their knowledge, ability and confidence in using basic computer operations increased significantly. They have a better understanding of how to utilize the library's resources.

The variations between general, Navajo, and Spanish-speaking surveys and the differences between pre- and post-surveys made the analysis challenging and results less meaningful. Additionally, considerably fewer participants than expected completed all survey questions. The evaluator recommends that FFNM and program leaders develop a list of program goals and corresponding guiding evaluation questions. Questions that assess achievement of program goals should be included in pre- and post-surveys so the evaluator can measure gains made due to participation in trainings. Pre- and post-surveys should be exactly the same except post-surveys should also include questions about usefulness of training components. Demographic questions such as "In what community do you currently reside?" and "Where is the location of the training you are participating in?" along with gender, ethnicity, age, etc. should be included in all surveys. Standardization of surveys will allow for a comparison of pre- and post-survey responses across communities and will also help track the number of participants attending at each site location. Making each pre-survey identical and each post-survey identical for all communities and languages (English and Spanish) will help to more accurately and efficiently report the data and make the data easier to manage. The evaluator will work closely with Fast Forward New Mexico to help develop a set of guiding evaluation questions and to revise pre and post-surveys.

G. Tri-State Cyberinfrastructure (CI) Training Opportunities

Background

Cyberinfrastructure (CI) training opportunities grants enable EPSCoR participants to broaden their knowledge of cyberlearning and climate change research. Faculty and students in the tri-states may apply for and receive funding to attend national workshops on computation and climate change. During the current reporting period five participants attended the SC11 (Supercomputing 2011) Conference in Seattle, Washington and one participant attended the Third Annual Santa Fe Conference on Global and Regional Climate Change in Santa Fe, New Mexico.

Assessment Development

The CI Training Opportunities survey was developed by program leaders at Idaho State University and revised by the evaluator (Appendix J). The purpose of the survey is to assess the value of the CI training opportunity and the impact of participation in the CI Training on participants. The survey is comprised of fifteen questions. The first seven items ask participants to report on demographic characteristics such as gender, ethnicity, institutional affiliation and current position. The following two items ask participants to report on whether the training they attended met their expectations. Participants responded to these items using a 5-point scale (0=*N/A*, 1=*did not meet my expectations*, 4=*far exceeded my expectations).* The next three items ask respondents to report on whether the training enhanced their ability to conduct research as well as increased their knowledge and skills of climate change and cyberinfrastructure literacy. Participants responded either yes or no to each of these items and were asked to explain their response. The last two items were open ended questions. The first open-ended item asked participants to comment on the application and award process. The second open-ended item requested participants to offer general comments or suggestions regarding the CI training they attended.

Data Collection Methods

The project leader emailed the evaluation survey to all CI training attendees. The project leader then emailed all completed surveys to the evaluator. The evaluator sent two reminders to the project leader for completed surveys to be returned.

Evaluation participants

Two CI trainings were attended by six participants during the current reporting period. Five participants attended the SC11 Conference and one participant attended the 3rd Annual Santa Fe Conference on Global and Regional Climate Change. Demographic data for all workshops is reported in Figure 22. The majority of respondents are male, Caucasian, faculty members.

Figure 22. Demographic description of CI training participants

Date	Name of workshop	Attendees				
		State	Gender	Ethnicity	Position	Institution
November 12-17, 2011	SC11 Conference	NM	Female	Asian	Researcher/PI	Santa Fe Institute/ Project GUTS
November 12-17, 2011	SC11 Conference	NM	Male	Caucasian	Faculty	NMSU
November 12-17, 2011	SC11 Conference	NV	Male	Caucasian	Research Faculty	DRI
November 12-17, 2011	SC11 Conference	NV	Male	Caucasian	Research Faculty	DRI
November 12-17, 2011	SC11 Conference	NM	Female	Hispanic	Member of Technical Staff	Sandia National Laboratories
October 30-November 4, 2011	3rd Annual Santa Fe Conference on Global and Regional Climate Change	NM	Male	Hispanic	Graduate Student	NMT

Evaluation Findings

Survey results for the CI Training workshops are reported in Figure 23. All respondents who attended CI trainings said the training *met* or *exceeded* their expectations to increase scientific capabilities and CI literacy.

Figure 23. CI Training workshop results

SC11 Conference (n=5)	
Increased scientific capabilities?	Met my expectations (4) Exceeded my expectations (1)
Increased CI-literacy?	Met my expectations (4) Exceeded my expectations (1)

Will this training enhance your ability to conduct research in your scientific field?

- *I learned about trends in supercomputing, tools and materials offered and potential partners for future proposals and projects.*
- *The interactions and contacts made with the professionals and peers at the training will result in follow-on research grant submissions, publications and possible future collaborations.*
- *Many of the exhibits I visited and the people I talked to, helped exposed me to a variety of visualization tools, like ParaView. There are many new technologies that I could incorporate into my coursework, and help teach students the basics of modern visualization techniques.*
- *It taught me about new ways to better use our computing hardware, like GPU acceleration.*
- *Showed me areas where different programming languages could possibly improve the performance of my code.*

SC11 Conference (n=5) (continued)

How has this training increased your awareness, skills and knowledge in the area of climate change or other scientific disciplines?

- *This training increased my awareness of exo-scale datasets and computational tools / techniques for working with huge data sets.*
- *This training increased my awareness and knowledge in the research and challenge areas that supercomputing researchers are working – those dealing with very large scale simulations and data sets.*
- *I attended several Education Program sessions on computational examples and simulations in Physics. These examples covered topics like statistical mechanics and even Newtonian motion that I found useful and some of which I plan on incorporating into my Physics class next semester.*
- *I learned about cluster computing techniques, which are commonly used in climate modeling.*
- *It taught me more about cloud computing and supercomputing and how they are used in other scientific fields.*

How has this training increased your CI-literacy (awareness, skills and knowledge)

- *I learned what national laboratories and supercomputing centers offer in terms of educational programs (and curricula) and outreach efforts. I also learned of materials for do-it-yourself supercomputers (Little Fe).*
- *I participated in several Education Program sessions on using Sage (a scientific computation program) in the classroom as a learning tool. These sessions exposed me to a variety of different methods of incorporating basic computational analysis into my classes. I plan on using Mathematica beginning next semester to teach students how a traditional learning experience can be enhanced with computational analysis.*
- *I learned about cloud computing and how it can be used for research.*
- *There were plenty of talk/lectures on cloud computing and how institutions work together to perform these task.*

How will you apply what you have learned to your studies, research, and/or career?

- *In developing new facets of Project GUTS and SCC curricula, tools and activities, I will consider what others have tried, their success rates, and I now have knowledge of other models of teacher professional development in Cyber-infrastructure, Computational Thinking, and Cyber learning that I did not have before.*
- *We have plans for future collaborations with several of the colleagues I met at the conference.*
- *I will use Mathematica next semester in my physics and mathematics courses to enhance the learning experience for my students. At SC11, I was exposed to several different ways computational analysis could be used in traditional classroom settings.*
- *I plan to use GPU computing techniques to accelerate our virtual reality applications.*
- *I am going to rewrite some of my modules in OpenCL and see if I get the performance boost that they claimed I would achieve. I'm also looking into new methods for cooling our server systems, such as oil cooling.*

Was the application review and award process timely?

- *Yes, exceedingly so. Thank you very much for your very fast response to my application*
- *The review and award process was timely. Within two weeks from when I submitted my application the award was made. I had plenty of time to plan the trip.*

Comments

- *Thank you for providing me with the opportunity to reflect on Project GUTS and SCC in the context of a national conference. The panel presentation on "Understanding Computational Thinking: Linking Educational Pathways to Workforce Needs" was very successful; 45 people attended and were engaged in the dialogue.*
- *This training opportunity would not have been possible without the grant from EPSCoR. I believe it will result in several future, highly valuable collaborations. Thank you for your support. Note: NM EPSCoR was also recognized in my panel presentation slides and I also thanked NM EPSCoR during my presentation.*
- *I appreciate the opportunity to have attended and participated in SC11. I am grateful to EPSCoR and its team.*
- *This was my first time going to this conference and I have to say that it was worthwhile. They started a Broader Engagement section so that people from other fields can come and learn something as well making it more applicable to other fields. I would recommend anyone to go to this because of what you can learn.*

3rd Annual Santa Fe Conference on Global and Regional Climate Change (n=1)	
Increased scientific capabilities?	Met my expectations
Increased CI-literacy?	Met my expectations
Will this training enhance your ability to conduct research in your scientific field? *In general, it is interesting and useful to see how the climate community approaches the scientific method. In particular, when it is applied to the understanding of complex systems such as the earth's climate. From a more practical perspective, climatic predictions are commonly used as limitations of these products. Moreover, it is a good way to learn about new data sets. inputs to force hydrologic models. This course helped me to better understand the limitations of these products. Moreover, it is a good way to learn about new data sets.*	
How has this training increased your awareness, skills and knowledge in the area of climate change or other scientific disciplines? *From the meeting, it was quite obvious that the climate community still debates the role of human inputs on the change of climatic conditions. It is clear that humans have an impact; however, this community aims to a better understanding of the climate system in order to separate natural variability and human induced changes. As a hydrologist, I am more conscious now about the limitations of climate models and IPCC scenarios.*	
How has this training increased your CI-literacy (awareness, skills and knowledge) *I learned about new climatic data sets and modeling approaches during this meeting.*	
How will you apply what you have learned to your studies, research, and/or career? *Some of the new data sets will be used for our hydrologic simulations.*	
Was the application review and award process timely? *Yes.*	

Commendations and recommendations

The CI Trainings Opportunities project is commended for supporting EPSCoR participants' professional development in very cutting-edge areas of scientific research. There was nearly an equal distribution of female to male attendees (2:4) and URMs to non URMs (2:4). All attendees reported increased CI-literacy, enhanced ability to conduct research, and increased skills and knowledge of climate change.

The number of CI training attendees has decreased slightly over the past two reporting periods. No attendees are from Idaho. Continue to focus on advertising the opportunity to attend CI trainings. Identify ways to notify students and faculty of upcoming conference opportunities. For example:

- Designate a section on the EPSCoR websites for "Upcoming Conferences" related to climate change and cyberinfrastructure. Post nationwide events that may be of interest to EPSCoR participants.
- Periodically send emails to EPSCoR participants to remind them about the opportunity to attend CI trainings that includes a link to the EPSCoR conference page and/or a list of upcoming conferences.
- Encourage PIs, project leaders, and faculty participants to personally invite their students to apply for CI training opportunity funding, especially when specific conferences or workshops are upcoming in which they may have an interest.

3.2 Impact of the Nevada EPSCOR Project

A. Development of list of outputs by university

The evaluator developed four categories of project outputs (activities) that lead to accomplishment of project outcomes (impacts). The four categories are research, facility, and personnel developments, and bridges between these developments. A preliminary list of outputs that have occurred throughout the project was developed by the evaluator and included in the 2010-11 Q4 report. The list was expanded using information contained in EPSCoR project documents and outputs were grouped by EPSCoR institution (DRI UNLV, and UNR). The list was reviewed and updated by the project PI and shared with project leads at a leadership meeting. The current list of project outputs by institution is included in Appendix K. This outputs list is intended to provide background information to project participants about developments that have occurred at their institution that can be attributed to the EPSCoR project. This will, in turn, enable them to more accurately articulate impacts they have experienced as a result of those outputs. The list is posted on Google Docs and the evaluator will send an invitation to project leads to review and augment the list.

Commendations and recommendations for the development of outputs

1. Send the names of people who should be invited to review the list to the evaluator so she can send them an invitation through Google docs. When the list is complete, it should be distributed to all EPSCoR participants and posted on the Nevada EPSCoR webpage.
2. To begin to bridge the connection between outputs and impacts, project leads should use this list to hold conversations with their teams. Leads should first discuss the outputs that have occurred at their institution and in their work area. Next they should discuss how the outputs are helping the participants and the institution achieve project outcomes and impacts. Finally, they should discuss how those outcomes/impacts are moving the project towards achieving project goals.

B. Benchmarks and milestones to track achievement of project goals

In order to track and report progress made towards achievement of project goals the evaluator needs to know project benchmarks and annual milestones however, it is too late in the three-year project to develop benchmarks and milestones. The evaluator will work with the PI to identify ways to track progress made towards achievement of project goals. If the Track 2 project is re-funded, the PI and project leads are encouraged to work with the project evaluator to develop benchmarks, milestones and timelines during the first few months of the project being funded.

C. Progress made on development of impacts video clips

As part of the impacts assessment, the evaluator will assist and facilitate the production of a six-minute video clip of project participants who have experienced significant impacts as a result of their participation in the Nevada EPSCoR project. The PI has solicited from project leads the names and contact information of possible "video stars" who are willing to discuss impacts they have experienced. The evaluator is working with Laurie Fruth, General Manager of UNLV TV to coordinate setting up interviews between UNLV TV and the interviewees. The evaluator has developed guiding interview questions and sent them to the General Manager. The questions are included in Appendix L. A list of all proposed interviewees is included in Appendix M. UNLV TV will videotape interviewees, edit the videos, and produce the final video clip. Interviews will be conducted at the annual meetings, group meeting sites, or at participants' research sites and the video clip will be produced during the 2011-12 project year. The evaluator will continue to update the PI of progress made towards completion of the video clips in quarterly reports.

Section 4. Commendations and Recommendations

Based on the results of this evaluation the following commendations and recommendations for the Tri-State EPSCoR project have been identified. Commendations and recommendations are listed for demographics, project components, and project impacts.

1. Demographics: Program leaders have done an excellent job increasing the number of women represented among each of the programs. It is clear that there is also a trend among GUTS participants that more underrepresented minorities are participating in EPSCoR programs. *Continue to work towards involving more underrepresented minorities in this EPSCoR project and activities. Advertise and publicize activities and events more widely and make a greater effort to personally invite individuals from underrepresented groups to apply for CI training opportunities and be a part of the curriculum development teams.*

2. **Project components**: Participants of each program that was evaluated this quarter assigned high ratings to program components and made useful suggestions for improvement. The evaluator stated recommendations at the end of each program component section of this report. *Review participants' suggestions as well as the evaluators' recommendations to improve each program. The evaluator will work with program leaders to implement recommendations.*

3. Project impacts: Significant progress has been made in developing a plan to identify and record impacts of this EPSCoR project. The evaluator has also developed an outputs chart to help bridge the connection between outputs and outcomes and to track activities that are leading to the achievement of short and long-term project goals. Leadership team members and participants have begun to think about impacts this project is having on participants, institutions, and the community.
The evaluator recommends that project leaders continue to have conversations about how outputs lead to short and long-term impacts.

Appendix A. Educational Materials Development Survey

zoomerang

Page 1 - Question 1 - Open Ended - One Line

What are the initials of your first, middle, and last name, in that order?
For example: LMK
This information will only be used to confirm when participants complete the survey. Initials will not be included in the response download.

Page 1 - Question 2 - Choice - One Answer (Bullets)

For which state are you developing materials?

- ○ Idaho
- ○ Nevada
- ○ New Mexico

Page 1 - Question 3 - Choice - One Answer (Bullets)

What is your gender?

- ○ Male
- ○ Female

Page 1 - Question 4 - Choice - One Answer (Bullets)

With which ethnicity do you most closely identify?

- ○ African American (Black)
- ○ Asian (Chinese, Filipino, Japanese, Vietnamese, etc.)
- ○ Caucasian (White)
- ○ East Indian (from India)
- ○ Hispanic (Latino/a, Mexican, Chicano/a, Brazilian)
- ○ Middle Eastern
- ○ Native American (American Indian)
- ○ Pacific Islander / Hawaiian
- ○ Other, please specify

Page 1 - Question 5 - Choice - Multiple Answers (Bullets)

Which position(s) do you hold that are related to this educational materials development project? Mark all that apply.

- ❑ Middle/High School Teacher
- ❑ Master's degree student
- ❑ University professor /instructor
- ❑ Support staff
- ❑ Program administrator /coordinator
- ❑ Other, please specify

Page 1 - Question 6 - Open Ended - One Line

What is the name of your institution (middle/high school, university, etc.)?

Page 1 - Question 7 - Choice - One Answer (Bullets)

For how long have you been working as part of the educational materials development team?

- ○ <6 months
- ○ 7 months to 12 months
- ○ 13 months to 24 months
- ○ 25 months to 36 months
- ○ >36 months

Page 2 - Question 8 - Open Ended - Comments Box

Please tell me about the process that you use to develop, test, and refine the educational materials.

Page 2 - Question 9 - Open Ended - Comments Box

Does your lesson planning follow a particular research-based lesson plan process? If so, please tell me the name and general reference information for the process.

Page 2 - Question 10 - Open Ended - Comments Box

Tell me about the materials that you have developed so far. How many? What type? What topics? Intended audience?

Page 2 - Question 11 - Open Ended - Comments Box

Have you received sufficient guidance and support from the program leaders? Please explain.

Page 2 - Question 12 - Open Ended - Comments Box

How can this educational materials development program be improved?

Page 2 - Question 13 - Open Ended - Comments Box

How has being a part of this educational materials development team has impacted you professionally?

Page 2 - Question 14 - Open Ended - Comments Box

Tell me how these materials will be used by teachers with students? When? Where?
In what type of learning situation?

Page 2 - Question 15 - Open Ended - Comments Box

What impact(s) do you intend for these materials to have on teachers who use them?

Page 2 - Question 16 - Open Ended - Comments Box

What impact(s) do you intend for these materials to have on students who use them?

Page 3 - Question 17 - Rating Scale - One Answer (Horizontal)

The primary goal of the cyberlearning portion of this Track 2 EPSCoR project is to use cyberinfrastructure to integrate climate change and water resources knowledge and research in STEM education. On a scale of 1-5 (1=not at all, 5=achieved extremely well) how well do you believe this educational materials development program is achieving this goal?

❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5

Page 3 - Question 18 - Open Ended - Comments Box

Please explain your rating.

Thank You Page

Thank you for completing this evaluation form.
If you have any questions please contact the project evaluator:
Lisa Kohne at lkohne@smartstartecs.com

Appendix B. New Mexico SCC Student Pre-survey

Introductory Questions

1. Please fill in the following information:

Please fill in the following information: Name:

School:

Email Address:

2. What is your grade?

○ 5 ◉ 6 ○ 7 ○ 8 ○ 9 ○ 10 ○ 11 ○ 12

3. What is your gender?

Female Male

4. Why are you participating in the Supercomputing Challenge?

5. What do you think or hope you will learn?

6. How did you learn about the Supercomputing Challenge?

7. Please select all that apply

	Yes	No
I have participated in a GUTS club		
I have participated in a GUTS/SC Round Up Summer program (1 week)		
I have participated in a GUTS summer workshop		
I have participated in a SC Kickoff conference		
I have taken a computer science class		

8. Please select the response that best fits how you feel about each statement below.

	Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
I know how to select a real world problem that I can model.					
I know how to make charts and graphs with data in a spreadsheet.					
I am good at using technology to communicate what I've learned with other people.					
I am good at using technology to better understand ideas that I learned in my classes.					
I am good at collecting information using technology (e.g, Internet, search engines).					
I know how to interpret data from computer models.					
I am good at using technology for public speaking.					
I know what it takes to be a good team member.					
I am good at using technology to organize information (spreadsheets, word processing).					
I am good at making spreadsheets for entering and sorting data.					
I know how to use computer models to test hypotheses.					
I know how to format a bibliography and cite sources.					
I know how to chose an appropriate computing language to model a project.					
I know how to write my own computer programs.					
I know the value of using a mentor for a project.					

Appendix C. New Mexico SCC Student Open-Ended Responses

Students shared how they learned about the Supercomputing Challenge.

Teacher/Mentor/Sponsor (102)

- *My ex-teacher told me about it, as I asked about the Imagine Cup this year*
- *My teacher has been taking students for many years. He introduced me to programming and the challenge.*
- *I learned about it through my computer teacher in middle school.*
- *My teacher Mr.Schum*
- *AP physics teacher Anita Nugent*
- *Through my AP computer science teacher (3)*
- *My science teacher.*
- *My bio-medical teacher.(3)*
- *My BioMed teacher showed our class this program*
- *My math teacher told me about the Supercomputing Challenge when I was in 9th grade*
- *Physics teacher (2)*
- *Math Teacher (2)*
- *My robotics teacher told me about it (2)*
- *Mr. G told me about it in Library Aide.*
- *My Gate teacher Told me (6)*
- *Through my Teacher (51)*
- *My MESA teacher (2)*
- *My 9th grade computer teacher told me about it*
- *My completely EPIC 6th grade teacher Mrs. Mikesell*
- *My sponsor teacher, Joan Newsom (3)*
- *From my 7th grade science teacher, who encouraged me to try this.(2)*
- *Through my teacher Mr. Edington (2)*
- *One of my teachers, Mrs Larish, told me about it (2)*
- *From my mentor Creighton Edington*
- *Ashley Ivins from The Ask Academy*
- *My teacher, Mrs. Larisch, informed me about it. I immediately told her I wanted to participate.*
- *I learned about the Supercomputing Challenge through my favorite principal Ms. Leanne.*
- *I got a flier from my teacher*
- *2 years ago a teacher brought it up in class*
- *I learned about it in class*
- *Homeschool group*
- *AP Physics class*
- *In my AP Computer Science class*
- *Teacher recommended it to me.*

School / Programs / Announcements(55)

- *Through Young Women in Computing, a computer science program for girls at NMSU.*
- *Over the summer, I attended SFI Computer and Modeling Program in Groton, Massachusetts, where I learned of this program.*
- *Through Gutsy Girls (where I am a student mentor)*
- *I learned about supercomputing challenge, when our adviser told us during one of our meetings in gutsy girls*
- *I learned about the Supercomputing Challenge through YWIC (Young Women in Computing) (3)*
- *I learned about it through a program where I learned about computer science this summer.*
- *At the school G.A.T.E program last year (2)*
- *Mesa club (6).*

- *I first heard about it from a program at our local university.*
- *I learned about this program Through the SFI complexity and modeling program.*
- *Fliers at school (3)*
- *At school (14)*
- *From my school, I learned about it three years ago, but never joined until this year.*
- *School announcements (8)*
- *I learned about the challenge through posters and announcements at Los Alamos Middle School*
- *My school participated in it one year and I felt like it was a good challenge*
- *I joined a team at my school.*
- *I learned about the Supercomputing Challenge by a poster in my school. I read it and later in computer class I got invited to it!*
- *I learned about the SC when I heard that last year's winners were from Aspen Elementary School. (3)*
- *Science fair project and local newspaper.*
- *On the front page of the blog.*
- *I read about it.*
- *Scientists*

Friends (33)
- *From my friends who did it last year. (9)*
- *Through friends (8)*
- *My friend told me about it. (11)*
- *Some friends joined it freshman year and they thought I might like it.*
- *A friend was giving a presentation, I ask about it and he asked me to join, and I accepted.*
- *My friend kept on telling me about supercomputing so I asked him how to join.*
- *I have participated for two years, I learned about it through some friends.*
- *I learned about through my friends and time at Los Alamos Middle School.*

In GUTS/SCC last year (21)
- *I was in Project GUTS in 8th grade (17).*
- *I did it last year (4)*

Parents/Siblings (19)
- *YWiC sent a link to my mother. They thought my sister and I would have fun.*
- *Our mom received an e-mail that had all of the information about the Supercomputing Challenge.*
- *My Dad/mom (4)*
- *Through a relative, who previously participated in the challenge.*
- *Older sibling/brother/sister(5)*
- *I did it last year, but I first learned about it when my sister did it a few years ago*
- *I learned about the supercomputing challenge from my sister who did it a year ago.*
- *My sister was involved in a summer camp with computer science*
- *My brother competed in this competition and got first place for 3 years.*
- *My brother told me about the very first year that he participated in it.*
- *From my brother who also participated in 2006 (2)*

Students explained why they are participating in the Supercomputing Challenge.

To learn programming, computer languages, and gain a better understanding of how computers work (67)
- *To try to model using a new language (Action Script 3.0) and I want to show issues with the way people are currently treating the environment.*
- *I am participating in the Supercomputing Challenge because it sounded interesting to me. I enjoy programming, so I knew that there would be programming involved.*
- *The Supercomputing Challenge gives me an opportunity to expand my knowledge in the field of computer science and to link prevalent issues with their technical aspects.*
- *I want to be able to program with real life situations.*

- *Because I seek to excel in computing tech. and it's fun!*
- *To expand my knowledge of Computer Science and its languages.*
- *To further my knowledge in the field of science and to broaden my programming abilities.*
- *To better my skills and to use them to implement my ideas in a complex and useful/interesting project, perhaps to solve a project.*
- *Because this program has very different problems about our city*
- *To learn more about hard complex problems and how to solve them.*
- *I am interested in using supercomputers to solve real world problems.*
- *I want to get more programming experience, learn more about social sciences, and programming in the real world*.
- *To program in sport*
- *Love programming*
- *The fun programming!*
- *I am interested in computer programming and modeling.*
- *To do computer programming and research, hone my skills*
- *I am interested in science and I would like to try to model some scientific problems in real world.*
- *I love computer programming and would like to learn more on the subject.*
- *To learn more about technology.*
- *I am participating because I want to get better at computer modeling.*
- *I am participating in the Supercomputing Challenge to support Miyamura High and further my knowledge in the area of programming and social sciences.*
- *I would really like compete because for a long time I have been using computers and never knew how they work. I feel this program can help me and maybe someday I can grow up with better understanding of how they work, so I can engineer them, hopeful make some new technology that benefits everyone.*
- *To learn more programming (14)*
- *Because I want to sharpen my programming skills.*
- *To better my understanding of computer languages*
- *I hope to better my understanding of programming, get an opportunity of using a supercomputer, I want to explore computer programming in-depth and through a structured process.*
- *I am participating because I want to become better at programming.*
- *To learn more computer languages (3)*
- *It sounds like a good chance to learn a scripting language.*
- *I am participating in the challenge to learn about programming languages and to learn how to solve common problems through computing.*
- *To learn more about computer programming, and to expand my knowledge (2)*
- *To further my knowledge of computers (5)*
- *I want to learn about compute ring and what it is about.*
- *So I can lean more stuff about star logo.*
- *To learn about computing and fundamentals of computer science (2)*
- *I want to learn more about computer programming, and how it is used in everyday life.*
- *To learn more about science (8)*
- *So I could be better at typing and technical stuff*

<u>Sounded like fun (39)</u>

- *It is really fun.*
- *I love to work with computers, so I put that motivation to good use (3).*
- *Curious*
- *Because I have a major interest in computers and computer science (2)*
- *Because I like computers and working with them. I enjoy math and science, they are my highest skills.*
- *I love computer programming*
- *I love Science and I would like to learn something new and enriching. (2)*
- *Because my older siblings were in it and I love the way it works and I love technology*
- *To learn and have fun (10)*
- *For fun and learning (6)*

- *To represent my school and have fun.*
- *It's an interesting program and seems fun to do*
- *For fun and it sounds really cool*
- *Because it sounded fun, and I was offered the challenge specially. I also like to show off!*
- *Because I think it will be fun to do*
- *I wish to participate in this because I was encouraged to try and, I thought it sounded fun!*
- *Because my friends are doing it and it sounds fun.*
- *It is fun and can help you later in life.*
- *Because it sounds fun and I want to learn more of what it's about.*
- *I like to try new things*
- *So I can be more involved in afterschool programs and enjoy science even more*

For the challenge, competition and experience (33)

- *Because I want to challenge myself and compete with others to check out what I can accomplish with my team. I love programming, so this is a great opportunity for me (3)*
- *I have participated for the last two years, and finished as a finalist in the last attempt. I have been interested in programming for a long time, and the Challenge provides learning opportunities and outlets.*
- *I am participating in the Super-computing Challenge, because it seems fun and challenging.*
- *I love challenges and believe that this will be exactly that!*
- *I get to challenge myself (6)*
- *I am very interested in science and computers and would like to learn more and compete in competitions (2)*
- *It would be a fun challenge and good learning experience (8)*
- *It seems very interesting compounded with many computing challenges (2)*
- *To get involved in an activity that pressures me to do my best.*
- *To see how I stack up against the other schools here in New Mexico*
- *I love programming. This tournament lets me compete in what I love.*
- *To further my knowledge in computer sciences and to compete with a team of peers to strive for a successful project.*
- *To be able to compete in computer science because it interests me and I like challenging myself in problem solving.*
- *For the experience of competing, other than a sports challenge.(2)*
- *Because I think it's great and fun experience in which I'll be able to expand my knowledge of computing(2)*

Prior experience in supercomputing challenge program/ programming coursework (25)

- *I participated in the Challenge in the year of 2010-2011 and had a great experience (2)*
- *Because it was a great experience last year. (6)*
- *I participated in 2010-2011 and enjoyed the Challenge. Also, my team was in the top 10 finalists and we think we have a chance at placing.*
- *I have participated in the last two years of the Challenge, and hope to do better than we did last year.*
- *I'm interesting in computer science and had a good experience with Supercomputing Challenge last year.*
- *Because I enjoy science, and love problem solving, and can do both through programming, I had a really awesome time last year, and am super excited for this year!*
- *I have previously participated in two Boatbill competitions, and this sounded interesting. I hope to learn quite a bit from this experience.*
- *I've done it for the past two years, and loved it (4).*
- *I am participating this year hoping to have a similar experience and broaden my knowledge of Java programming.*
- *I really liked project GUTS and when I heard about the supercomputing challenge it sounded really fun*
- *I wanted to do it again with one of my old friends.*
- *I had taken a summer course in Groton, Massachusetts about complexity and modeling where I learned about this program. (2)*
- *My friend asked me to work with her*
- *Because it sounds interesting and my friends liked it last year and are doing it this year.*
- *My brother did it last year.*

To prepare for college/get a scholarship/ enhance resume (17)

- *I am interested in further education in the field of computer science.*
- *To get a scholarship, which will help me in my starting years of college.*
- *College application / for the scholarship (5)*
- *It seems like an interesting and fun experience that will go great on my college applications.*
- *I am participating in the Supercomputing challenge to learn programming, to further my knowledge in computer science for future college courses.*
- *There are lots of opportunities for great scholarships.*
- *Has great opportunities for scholarships and looks good on a college resume (2)*
- *Scholarship, experience with programming, fun (2)*
- *I want a chance to win a scholarship in technology.*
- *I would like to better my knowledge of computer, computing, and Major Scholarships are involved.*
- *It is a nice experience, and it would look nice on my college transcript.*

Teacher recommended (14)

- *My Bio-medical teacher recommended it to my group and me.*
- *My gate teacher asked me*
- *My teacher wanted several students to be involved and it sounded interesting (2)*
- *Teacher recommended it (9)*
- *Because my sponsor teacher recommended I participate in it and I thought it might interest me personally.*

To meet new people and be part of a team (12)

- *Because I want to sharpen my teamwork skills.*
- *I'm participating so I can have the opportunity to learn more about programming, and also meet people that have the same interest as me.*
- *I want to bring my own experiences with a group of other motivated individuals and build a computer stimulated program.*
- *To help my team succeed*
- *I get to meet lots of new people and see lots of very interesting things,*
- *For the networking opportunities*
- *I think it would be a lot of fun to try and work with my team to win*
- *I hope to get an opportunity to meet people with interests similar to mine*
- *I want to explore computer programming in-depth through a structured process alongside familiar team members.*
- *I learned that you can get great prizes and I wanted to have lots of fun and have fun with my friends and school!*
- *I am participating because I want to have fun, and work better in teams.*
- *I love computer science, and this challenge is great way to meet others as interested in CS as I am.*

Required for class / grade requirement (6)

- *It's required for my computer class (2)*
- *For a class*
- *Part of my grade for a computer science class*
- *For my master project at my school. I am doing this with my partner*
- *I am participating because it's for a grade and I want to learn about new stuff*

Interested in science as a future career (5)

- *This will help me receive a very well paid job and a job in mathematics.*
- *I love programming and will become a programmer in the future. This will be a great experience*
- *Computer programming interests me very much. I plan on it being my profession in the future.*
- *Because I am interested in pursuing scientific study in the future*
- *Computer programming interests me, and I plan to go into a career as a programmer.*

Appendix D. CI for Industry General Audience Pre-survey

FFNM Pre-class assessment

1. FFNM Marketing and Publicity

1. Please enter your 10-digit primary telephone number. Do not use dashes, parentheses, or spaces.

Example: 5051112222

2. How did you learn about these trainings? (check all that apply)

- ☐ Here at the library
- ☐ At my place of employment
- ☐ Community agency or public organization
- ☐ Word of mouth or a friend told me
- ☐ Poster or flier/brochure posted around town
- ☐ Newspaper
- ☐ Radio
- ☐ Other:

2. Self Assessment

1. On average, how often do you use a computer?

- I use a computer more than 5 times per week.
- I use a computer about 4 or 5 times per week.
- I use a computer about 3 times per week.
- I use a computer about 1-2 times per week.
- I use a computer less than once a week.

2. On average, how often do you use the Internet?

- I use the Internet more than 5 times per week.
- I use the Internet about 4 or 5 times per week.
- I use the Internet about 3 times per week.
- I use the Internet about 1-2 times per week.
- I use the Internet less than once a week.

3. Please rate your agreement with the following statements:

	Agree strongly	Agree	Agree somewhat	Disagree	Disagree strongly
I have a good understanding of, and familiarity with, computers, computer terminology, and computer skills and concepts.					
I am able to use basic computer operations, tasks, and tools.					
I am generally comfortable and confident with computers.					
I am interested in computers and computer applications and uses.					
I am aware of, and knowledgeable about, high speed Internet Broadband connections.					

3. Digital Context

1. In what areas of your life do you consider computer and Internet skills significant:

1 = No significance
2 = Minor significance
3 = Some significance
4 = Quite a bit of significance
5 = Great significance

	1	2	3	4	5
Professional – They affect my professional or employment status or options.					
Economic – They affect my economic standing or opportunities for economic growth.					
Educational – They affect my educational goals or access to educational programs.					
Social – They affect my interactions with others and/or their perception of me.					
Personal relations – They affect my ability to stay in touch with family and friends.					
Community relations – They affect my ability to stay in touch with my community through knowledge about local events and news.					
Self-image – They affect my sense of independence, competence or relevance.					

Appendix E. CI for Industry General Audience Post-survey

FFNM Post-class evaluation

1. FFNM Marketing and Publicity

1. Please enter your 10-digit primary telephone number:

2. Which class did you take today?

- ○ Basic Computer Skills
- ○ Introduction to the Internet
- ○ Selecting and Maintaining a Computer
- ○ How to Take an Online Course
- ○ Internet Tools for Business: Reducing Costs
- ○ Internet Tools for Business: Increasing Sales
- ○ Social Media for Business: Choosing Tools
- ○ Social Media for Business: Promoting your Business

2. Training and Trainer Evaluation

1. Please rate how much do you agree or disagree about each of the following statements.

	Agree strongly	Agree	Agree somewhat	Disagree	Disagree strongly
This training was engaging, well-organized, and clear.	○	○	○	○	○
This training made frequent use of practical, hands-on, in- class activities.	○	○	○	○	○
This training covered an appropriate number of topics and skills (not too many; not too few).	○	○	○	○	○
Covered an appropriate level of topics and skills (not too easy; not too hard).	○	○	○	○	○
This training fostered positive classroom interactions and relationships.	○	○	○	○	○

2. Please rate the following statements about the trainer.

1 = Statement is NOT very true
2 = Statement is slightly true
3 = Statement is somewhat true
4 = Statement is true
5 = Statement is VERY true

	1	2	3	4	5
The Trainer was professional, respectful and accessible in delivery, interactions, and manner.	○	○	○	○	○
The Trainer was knowledgeable in the content area.	○	○	○	○	○
The Trainer was flexible and responsive to questions, needs, and requests.	○	○	○	○	○
The trainer was effective in creating a comfortable and enjoyable learning environment.	○	○	○	○	○

3. Each statement below makes a claim about the way in which the trainings affected your view of your local public library. Please rate each statement according to the scale provided.

	Agree strongly	Agree	Agree somewhat	Disagree	Disagree strongly
I am now more aware that the library offers resources beyond books and circulating media.	○	○	○	○	○
I am now more likely to consider other programs and trainings offered at the library.	○	○	○	○	○
I am now more aware of the library as a resource for improving digital and computer skills.	○	○	○	○	○
I am now more aware of the library as a resource for small businesses and business related skills.	○	○	○	○	○
I am now more interested in exploring the library's digital resources and databases.	○	○	○	○	○

3. Self Assessment

1. Please rate your agreement with the following statements:

	Agree strongly	Agree	Agree somewhat	Disagree	Disagree strongly
I have a good understanding of, and familiarity with, computers, computer terminology, and computer skills and concepts.	○	○	○	○	○
The trainings helped improve my understanding of, and familiarity with computers, computer terminology, and computer skills and concepts.	○	○	○	○	○
I am able to use basic computer operations, tasks, and tools.	○	○	○	○	○
The trainings helped improve my ability to use basic computer operations, tasks and tools.	○	○	○	○	○
I am generally comfortable and confident with computers.	○	○	○	○	○
The trainings helped improve my comfort and confidence with computers.	○	○	○	○	○
I am interested in computers and computer applications and uses.	○	○	○	○	○
The trainings helped improve my interest in computers and computer applications and uses.	○	○	○	○	○
I am aware of, and knowledgeable about, high speed Internet Broadband connections.	○	○	○	○	○
The trainings helped improve my awareness and knowledge about high speed Internet Broadband connections.	○	○	○	○	○

4. Digital Context

1. In what areas of your life do you consider computer and Internet skills significant:

1 = No significance
2 = Minor significance
3 = Some significance
4 = Quite a bit of significance
5 = Great significance

	1	2	3	4	5
Professional – They affect my professional or employment status or options.	○	○	○	○	○
Economic – They affect my economic standing or opportunities for economic growth.	○	○	○	○	○
Educational – They affect my educational goals or access to educational programs.	○	○	○	○	○
Social – They affect my interactions with others and/or their perception of me.	○	○	○	○	○
Personal relations – They affect my ability to stay in touch with family and friends.	○	○	○	○	○
Community relations – They affect my ability to stay in touch with my community through knowledge about local events and news.	○	○	○	○	○
Self-image – They affect my sense of independence, competence or relevance.	○	○	○	○	○

Appendix F. CI for Industry Navajo Pre-survey

Crownpoint Pre-class assessment

1. FFNM Pre class survey

This information will be held anonymously and will not be shared outside of our grant program. We very much appreciate your time and information.

1. Please enter your 10-digit primary telephone number. Do not use dashes, parentheses, or spaces.
Example: 5051112222

2. How did you learn about these trainings? (check all that apply)

- ☐ At my place of employment
- ☐ Community agency or public organization
- ☐ Word of mouth -- a friend told me
- ☐ Poster or flier around town
- ☐ Newspaper
- ☐ Radio
- ☐ Other:

2. Self Assessment

1. Please rate your agreement with the following statements:

	Agree strongly	Agree	Agree somewhat	Disagree	Disagree strongly
I have a good understanding of, and familiarity with, computers, computer terminology, and computer skills and concepts.	○	○	○	○	○
I am able to use basic computer operations, tasks, and tools.	○	○	○	○	○
I am generally comfortable and confident with computers.	○	○	○	○	○
I am interested in computers and computer applications and uses.	○	○	○	○	○
I am aware of, and knowledgeable about, high speed Internet Broadband connections.	○	○	○	○	○

3. Digital Context

1. In what areas of your life do you consider computer and Internet skills important:

Internet skills important:

1 = Not important at all
2 = A little important
3 = Somewhat important
4 = Very important
5 = Extremely important

	1	2	3	4	5
Professional – They affect my professional or employment status or options.	○	○	○	○	○
Economic – They affect my economic standing or opportunities for economic growth.	○	○	○	○	○
Educational – They affect my educational goals or access to educational programs.	○	○	○	○	○
Social – They affect my interactions with others and/or their perception of me.	○	○	○	○	○
Personal relations – They affect my ability to stay in touch with family and friends.	○	○	○	○	○
Community relations – They affect my ability to stay in touch with my community through knowledge about local events and news.	○	○	○	○	○
Self-image – They affect my sense of independence, competence or relevance.	○	○	○	○	○

2. Describe what computer or Internet skills or tools you hope to learn in this class.

4. Demographic Information

1. How old are you?

- ○ 0-17 years old
- ○ 18-30 years old
- ○ 31-45 years old
- ○ 46-60 years old
- ○ 61 or older

2. What is your household's annual income?

- ○ Less than $10,000
- ○ Between $10,000-$25,000
- ○ Over $25,000

3. How many children live in your home?

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6

4. What is your race or ethnic background?

Appendix G. CI for Industry Navajo Post-survey

Crownpoint Post-class assessment

1. FFNM Post class survey

This information will be held anonymously and will not be shared outside of our grant program. We very much appreciate your time and information.

1. Please enter your 10-digit primary telephone number. Do not use dashes, parentheses, or spaces.
Example: 5051112222

2. Self Assessment

1. Please rate your agreement with the following statements:

	Agree strongly	Agree	Agree somewhat	Disagree	Disagree strongly
I have a good understanding of, and familiarity with, computers, computer terminology, and computer skills and concepts.	○	○	○	○	○
I am able to use basic computer operations, tasks, and tools.	○	○	○	○	○
I am generally comfortable and confident with computers.	○	○	○	○	○
I am interested in computers and computer applications and uses.	○	○	○	○	○
I am aware of, and knowledgeable about, high speed Internet Broadband connections.	○	○	○	○	○

3. Digital Context

1. In what areas of your life do you consider computer and Internet skills important:

1 = Not important at all
2 = A little important
3 = Somewhat important
4 = Very important
5 = Extremely important

	1	2	3	4	5
Professional – They affect my professional or employment status or options.	○	○	○	○	○
Economic – They affect my economic standing or opportunities for economic growth.	○	○	○	○	○
Educational – They affect my educational goals or access to educational programs.	○	○	○	○	○
Social – They affect my interactions with others and/or their perception of me.	○	○	○	○	○
Personal relations – They affect my ability to stay in touch with family and friends.	○	○	○	○	○
Community relations – They affect my ability to stay in touch with my community through knowledge about local events and news.	○	○	○	○	○
Self-image – They affect my sense of independence, competence or relevance.	○	○	○	○	○

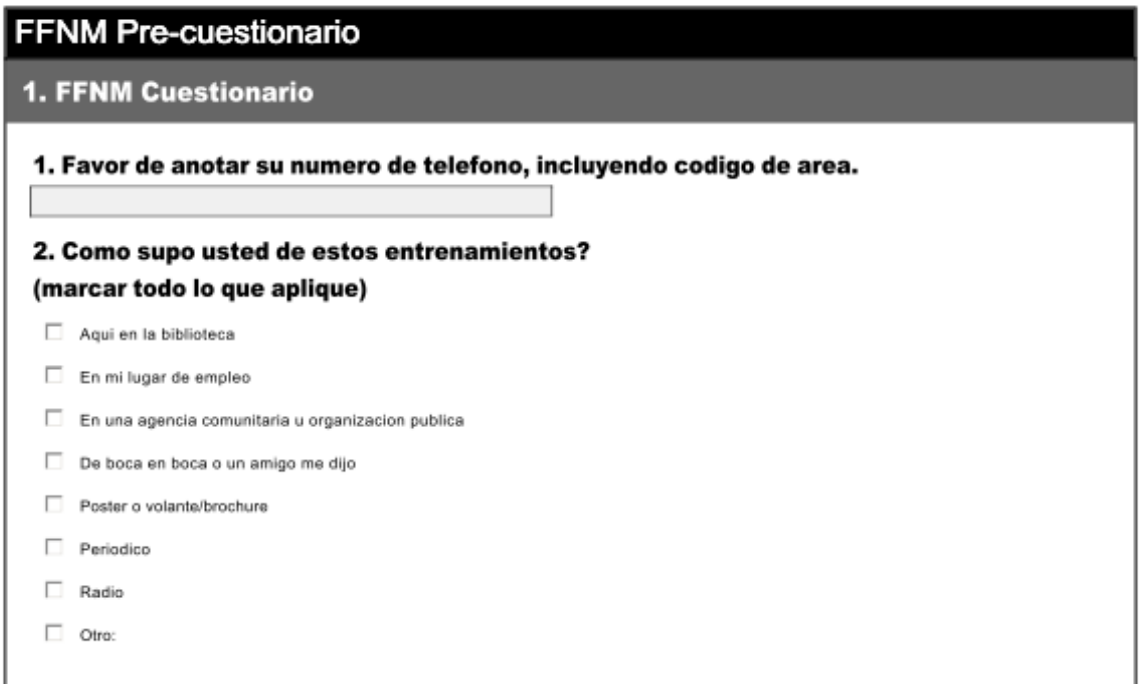
2. Describe what computer or Internet skills or tools you most expect to use after this class.

4. Demographic Information

1. If you work in any of the following fields please check that box.

- ☐ Weaving/textiles
- ☐ Jewelry
- ☐ Painting/art
- ☐ Performance
- ☐ Farming/ranching
- ☐ None of the above

Appendix H. CI for Industry Spanish Pre-survey



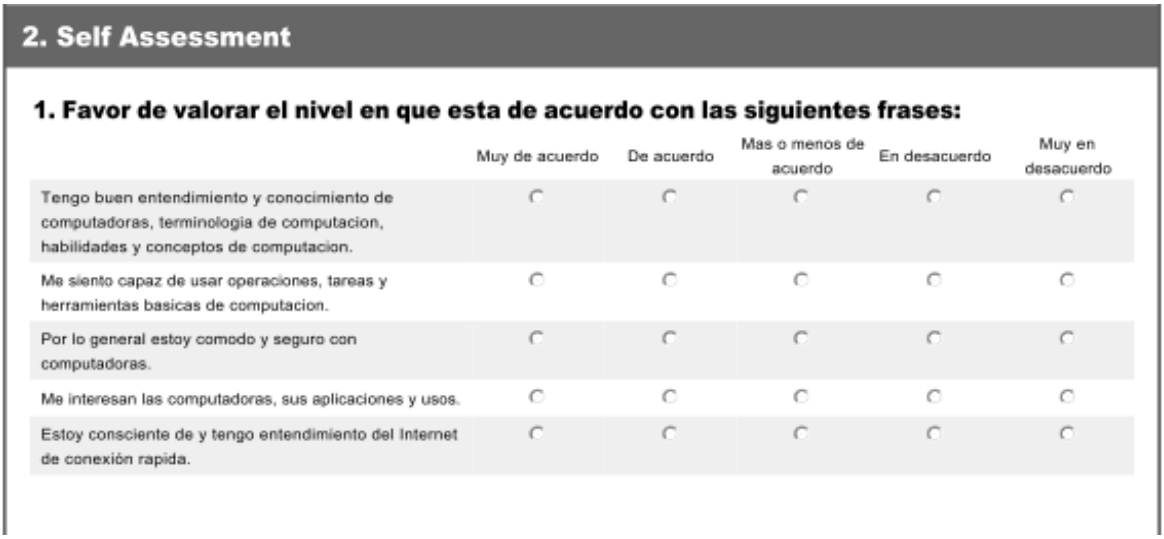
FFNM Pre-cuestionario

1. FFNM Cuestionario

1. Favor de anotar su numero de telefono, incluyendo codigo de area.

2. Como supo usted de estos entrenamientos?
(marcar todo lo que aplique)

- ☐ Aqui en la biblioteca
- ☐ En mi lugar de empleo
- ☐ En una agencia comunitaria u organizacion publica
- ☐ De boca en boca o un amigo me dijo
- ☐ Poster o volante/brochure
- ☐ Periodico
- ☐ Radio
- ☐ Otro:



2. Self Assessment

1. Favor de valorar el nivel en que esta de acuerdo con las siguientes frases:

	Muy de acuerdo	De acuerdo	Mas o menos de acuerdo	En desacuerdo	Muy en desacuerdo
Tengo buen entendimiento y conocimiento de computadoras, terminologia de computacion, habilidades y conceptos de computacion.	○	○	○	○	○
Me siento capaz de usar operaciones, tareas y herramientas basicas de computacion.	○	○	○	○	○
Por lo general estoy comodo y seguro con computadoras.	○	○	○	○	○
Me interesan las computadoras, sus aplicaciones y usos.	○	○	○	○	○
Estoy consciente de y tengo entendimiento del Internet de conexión rapida.	○	○	○	○	○

3. Digital Context

1. De que maneras en su vida considera importante tener habilidades de computacion y Internet:

1 = No es importante
2 = Un poco importante
3 = Mas o menos importante
4 = Importante
5 = Muy importante

	1	2	3	4	5
Profesional - Esto afecta mi estatus u opciones profesionales o de empleo.	○	○	○	○	○
Economicos - Esto afecta mi posicion economica o mis oportunidades para crecimiento economico.	○	○	○	○	○
Educacional - Esto afecta mis metas educacionales o mi acceso a programas educacionales.	○	○	○	○	○
Social - Esto afecta mis interacciones con otros y/o como ellos me ven.	○	○	○	○	○
Relaciones personales - Esto afecta mi capacidad de mantenerse en contacto con familia y amigos.	○	○	○	○	○
Relaciones comunitarias - Esto afecta mi capacidad de mantenerse en contacto con mi comunidad por medio de conocer eventos y noticias locales.	○	○	○	○	○
Auto-imagen- Esto afecta mi sentido de independencia, competencia, o relevancia.	○	○	○	○	○

2. Usted tiene acceso al Internet (o correo electrónico) en su domicilio primario (aún si usted no lo usa)?

- ○ Si
- ○ No

3. Usted tiene acceso al Internet (o correo electrónico) en su negocio?

- ○ Si
- ○ No

4. ¿Hay niños viviendo en su domicilio? Si hay, ¿cuántos?

- ○ No
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5 ó más

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Appendix I. CI for Industry Spanish Post-survey

FFNM Post-cuestionario

1. FFNM

1. Favor de anotar su número de teléfono incluyendo el codigo de area:

2. Evaluación

1. Favor de valorar el nivel en que esta de acuerdo con las siguientes frases:

	Muy de acuerdo	De acuerdo	Mas o menos de acuerdo	En desacuerdo	Muy en desacuerdo
Este entrenamiento fue bien organizado, claro, y me involucraba.	○	○	○	○	○
Este entrenamiento regularmente incluyo el uso de actividades practicas.	○	○	○	○	○
Este entrenamiento cubrio una cantidad apropriada de temas y habilidades (no fue demasiado; no fue muy poco).	○	○	○	○	○
Este entrenamiento cubrio un nivel apropriado de temas y habilidades (no fue ni muy facil ni muy dificil)	○	○	○	○	○
Este entrenamiento desarrollo interacciones y relaciones positivas dentro de la sala de computacion.	○	○	○	○	○

2. Favor de valorar las siguientes frases sobre el/la entrenador/a.

1 = Esta frase NO es cierto
2 = Esta frase es ligeramente cierto
3 = Esta frase es cierto en ciertas formas
4 = Esta frase es cierto
5 = Esta frase es MUY cierto

	1	2	3	4	5
Entrenador/a fue profesional, respetuoso, y accesible en su forma de presentar el contenido, las interacciones, y forma de ser.	○	○	○	○	○
Entrenador/a fue bien informado con el contenido.	○	○	○	○	○
Entrendaor/a fue flexible y sensible a preguntas, necesidades, y peticiones.	○	○	○	○	○
Entrenador/a fue eficaz en crear un ambiente comodo y agradable.	○	○	○	○	○

3. Digital Contexto

1. De que maneras en su vida considera importante tener habilidades de computacion y Internet:

1 = No es importante

2 = Un poco importante

3 = Mas o menos importante

4 = Importante

5 = Muy importante

	1	2	3	4	5
Profesional - Esto afecta mi estatus u opciones profesionales o de empleo.	○	○	○	○	○
Economicos - Esto afecta mi posicion economica o mis oportunidades para crecimiento economico.	○	○	○	○	○
Educacional - Esto afecta mis metas educacionales o mi acceso a programas educacionales.	○	○	○	○	○
Social - Esto afecta mis interacciones con otros y/o como ellos me ven.	○	○	○	○	○
Relaciones personales - Esto afecta mi capacidad de mantenerse en contacto con familia y amigos.	○	○	○	○	○
Relaciones comunitarias - Esto afecta mi capacidad de mantenerse en contacto con mi comunidad por medio de conocer eventos y noticias locales.	○	○	○	○	○
Auto-imagen- Esto afecta mi sentido de independencia, competencia, o relevancia.	○	○	○	○	○

2. Cual del siguiente mejor le describe a usted?

- ○ Soy dueno de un pequeno negocio.
- ○ Estoy desempleado o buscando trabajo.
- ○ Soy un empleado o miembro de familia en un pequeno negocio.
- ○ Soy un empleado del gobierno.
- ○ Trabajo para una organizacion sin fines de lucro.
- ○ Estoy considerando empezar un pequeno negocio.
- ○ Otro (favor de comentar)

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3. Si usted es dueno de un pequeno negocio o si usted trabaja en cualquier de las siguientes areas, favor de marcar todo lo que aplique a su industria:

- [ ] Arte
- [ ] Arquitectura o diseño
- [ ] Pequeña producción de granja o alimento
- [ ] Museos o Galerías
- [ ] Television o Radio
- [ ] Teatro o Arte de Actuacion
- [ ] Joyeria o Moda de Ropa
- [ ] Escritura o Industria Editorial
- [ ] Cine o Musica

3. 1. Favor de valorar el nivel en que esta de acuerdo con las siguientes frases:

	Muy de acuerdo	De acuerdo	Más o menos	En desacuerdo	Muy en desacuerdo
Tengo buen entendimiento y conocimiento de computadoras, terminologia de computacion, habilidades y conceptos de computacion.	○	○	○	○	○
Me siento capaz de usar operaciones, tareas y herramientas basicas de computacion.	○	○	○	○	○
Por lo general estoy comodo y seguro con computadoras.	○	○	○	○	○
Me interesan las computadoras, sus aplicaciones y usos.	○	○	○	○	○
Estoy consciente de y tengo entendimiento del Internet de conexión rapida.	○	○	○	○	○

Appendix J. Cyberinfrastructure Training Evaluation

Idaho, Nevada and New Mexico EPSCoR - CI Training Evaluation

Please answer the following questions about the CI Training workshop you attended. **Double click the box to make your selection.**

1. What is your name?

2. What is the name of the training you attended?

3. What is the date(s) of the training you attended the training?

4. With which gender do you identify?
   - ☐ Male
   - ☐ Female

5. With which ethnicity do you most closely identify?
   - ☐ African American (Black)
   - ☐ Asian (Chinese, Filipino, Japanese, Vietnamese, etc.)
   - ☐ Caucasian (White)
   - ☐ East Indian (from India)
   - ☐ Hispanic (Latino/a, Mexican, Chicano/a, Brazilian)
   - ☐ Middle Eastern
   - ☐ Native American (American Indian)
   - ☐ Pacific Islander / Hawaiian
   - ☐ Other, please specify:

6. What is your position?
   - ☐ Faculty
   - ☐ Research faculty
   - ☐ Post-doc
   - ☐ Graduate student – Masters
   - ☐ Graduate student – Ph.D.
   - ☐ Undergraduate student
   - ☐ Other, please specify:

7. With which institution with which you are affiliated?
   - ☐ Desert Research Institute
   - ☐ Idaho State University
   - ☐ New Mexico State University
   - ☐ New Mexico Tech
   - ☐ University of Idaho
   - ☐ University of Nevada, Las Vegas
   - ☐ University of Nevada, Reno
   - ☐ University New Mexico
   - ☐ Other, please specify:

Please rate the training you attended in the following areas. Put an X in the box.

	Did not meet my expectations	Met my expectations	Exceeded my expectations	Far exceeded my expectations	N/A
8. To what degree did this training meet your expectations for increasing your **scientific capabilities**?					
9. To what degree did this training meet your expectations for increasing your **CI-literacy**?					

10. Will this training enhance your ability to conduct research in your scientific field?
☐ Yes ☐ No

Please explain.

11. Has this training increased your awareness, skills and knowledge in the area of climate change or other scientific disciplines?
☐ Yes ☐ No

Please explain.

12. Has this training increased your awareness, skills and knowledge in the area of cyberlearning and/or cyberinfrastructure literacy?
Yes ☐ No

Please explain.

13. Will you be able to apply what you have learned to your studies, research and/or career?
☐ Yes ☐ No

If yes, please explain how you will apply what you have learned.

14. Was the application review and award process timely?

15. Is there anything else you would like to share with the EPSCoR project leads or directors?

Thank you for completing this evaluation form. Please email this form back to the person who sent it to you or to the project evaluator: Lisa Kohne at lkohne@smartstartecs.com

Appendix K. Outputs by Institution

Output area	Possible activities	DRI	UNLV	UNR	BSU	ISI	UI	NMT	UNM
Research Development									
• Conduct collaborative and/or interdisciplinary research	– Seed grants to link professionals throughout America and beyond in STEM settings – WebEx – Testing and Usability – Creation and runs of specific research scenarios	–	–	–	–	–	–	–	–
Facility development									
• Purchase, develop and/or use equipment and tools • Establish facilities • Establish cyber-infrastructure including data portals, software, hardware, connectivity, bandwidth, inter-operability, and data access	– Upgrade networking and infrastructure – Develop model for data synchronization – Develop data portals – Install education portals – Purchase and install networking monitoring and security software and hardware – Purchase and install videoconferencing hardware – Purchase and install gateways	–	–	–	–	–	–	–	–
Personnel development									
• Increase knowledge and skills necessary to use cyberinfrastructure • Conduct and/or attend trainings and meetings • Influence individuals educational and career opportunities/choices • Hire/train/mentor people	– CI training for graduate students and faculty – CI related teacher professional development – Internet training to small business entrepreneurs – Tri-State Diversity Action Plan – Innovative Working Groups – Cyberinfrastructure Working Group – Undergraduate assistantships – Recruit and retain post docs, students, and technicians – Summer Institutes	–	–	–	–	–	–	–	–
Bridges between research, facilities, and personnel									
• Increased funding • Develop instructional materials, programs, plans, centers • Use new knowledge, facilities, equipment, and cyberinfrastructure • Communicate findings through papers and presentations	– Curriculum modules to support teacher summer science institute – Supercomputing Challenge teams – Project Guts – Project development leadership team – Cyberlearning websites – Cyberlearning curriculum and materials development – Presentations at conferences – Publication of papers – Develop Industry CI days	–	–	–	–	–	–	–	–

Appendix L: Interview Script for Impacts Video Clip

1. What has the EPSCoR grant provided for you, your lab, your school...? Examples may include facilities, equipment, cyberinfrastructure, attendance at trainings, new hires, development of programs, increased research capabilities...

2. What have these "things" enabled you to do that you weren't able to do before? Examples may include growth in knowledge/skills, scientific discoveries, communication of findings/information, increased business development/services...

3. What do you believe have been/will be the long-term outcomes of these discoveries/ communication/knowledge/development...? Examples may include improved response to scientific/societal challenges, more informed decision-making, increased workforce capacity, increased state capacity to compete for research funding...

Example of desired impacts statement:
This EPSCoR grant has provided my lab with increased network speed.
This has enabled me to do ___ type of analysis which I was not able to do before the network improvements.
This has resulted in discovery of ____. I subsequently published a paper in the Journal of ___ and received funding from NSF to continue my research.
I believe these findings will lead to more informed decision-making by our local policy-makers because it will provide them with a clearer understanding of how climate change is affecting our region.

Appendix M: List of Proposed Interviewees for Impacts Video

Last Name	First Name	Institution	Position
Breland	Adrienne	UNR	Postdoc
White	Tifani	ISU - ID Falls	Grad Student
Ames	Dan	ISU - ID Falls	Faculty
Esquivel	Jerry	NMT	Educator
Sherson	Lauren	UNM	Graduate Student
Brown	Stephen	UNM	Graduate
Steele	Caiti	NM State	Faculty
Loy	Alice	NM	Business
Francisco	Bennie	NM	Business
Penney	Sarah	UI	Diversity Coordinator
Daniel	Mary Jo	UNM	Assoc PD and Diversity Coordinator
Casella	Michele	NV - NSHE	Education, Outreach, and Diversity Coordinator
Patel	Jigar	UNR	PhD Graduate Student