Welcome to the annual report for the Raggio Research Center (RRC) for Science, Technology, Engineering, and Mathematics (STEM) Education. This report is an update on our current grants and projects, our dedicated staff, and our offered services.

2012 was a busy and productive year. We have some new grant projects, collaborations, and exciting changes for 2013. We continue to compete for increasingly fewer research dollars and have forged some exciting new relationships and collaborations with faculty in the colleges of science and engineering.

One of our new grants is the five-year Northern Nevada English Learning Initiative –NNELI – which strives to make a difference in STEM education for English language learners. Both in-service and pre-service teachers are included in the NNELI training, as are the paraprofessionals who work in Washoe County classrooms. Through NNELI and our other grant activities, we continue to promote professional development of educators in STEM fields, thus increasing students’ awareness of those fields. Our projects also provide educational outreach opportunities for local and state scientists who participate with us to positively impact STEM literacy in Nevada.

March 2013 will mark a transition for us as Dr. David Crowther assumes the role of Director. Dr. Crowther is a Professor of Science Education and has been with the UNR College of Education since 1996 teaching science methods, general biology, and a number of graduate courses in science education and research. Dr. Crowther’s current research interests involve teaching science through inquiry to develop English language acquisition for English Language Learners (ELL), Inquiry content instruction at both K-12 and the University level, Science, Technology, Engineering and Mathematics (STEM) Education K-12, and general methods of inquiry science teaching at the graduate and undergraduate level.

The mission of the Raggio Research Center is to advance the theory and practice of STEM Education, with a focus on underrepresented groups. We accomplish this mission through research, development, instruction, dissemination, leadership, and outreach.

We encourage you to consider the RRC for the evaluation, education, and outreach components of your grants and other projects.

**Raggio Research Center Goals**

1. Conduct research on STEM education at the highest level on questions of state and national importance as applied to Nevada’s needs.

2. Recruit and promote the inclusion of underrepresented populations in STEM education opportunities at UNR.

3. Form interdisciplinary research teams of STEM content and education faculty and graduate students, together with teachers, to develop, deliver, and assess/evaluate our programs and activities.

4. Serve as an interdisciplinary education center to develop research-rich experiences for pre-service and in-service teachers to deepen and enhance STEM concepts and pedagogy.

5. Develop outreach activities and programs for students of all ages to support knowledge acquisition in the STEM disciplines.

6. Disseminate standards-based and scientifically supported research and information on STEM education.
About the Raggio Research Center

The Raggio Research Center (RRC) for Science, Technology, Engineering, and Mathematics (STEM) Education was created in the College of Education in 1997 as an educational outreach and training facility with the primary focus of conducting and supporting educational research and outreach activities in STEM fields.

Over the years, the RRC has served as a catalyst for partnerships involving the Washoe County School District, the Desert Research Institute, the UNR School of Medicine, the College of Engineering, and other institutions. Dr. Dudley Cate was appointed as the center’s first director in 1997. In 2002, Dr. Pamela Cantrell took over as director. In 2003, Jacque Ewing-Taylor joined the RRC as a projects manager, bringing with her a project-based staff and grants with an emphasis on educational technology. Cantrell left UNR in June 2006 and Ewing-Taylor managed the center until July 2007 when Dr. David Thomas was hired to be the director. Ewing-Taylor has managed the center as Interim Director since his retirement in June 2009. In March 2013, Dr. David Crowther will become the Center’s Director.

Center activities have included science and technology education support for teachers, science presentations for hundreds of students in grades 4-6, STEM career-related presentations for several hundred high school juniors, intensive educational technology integration training for pre-service education students, and on-site field studies of earthquake and volcanic areas of the western United States. The purpose of the RRC is to promote a better understanding of the STEM disciplines by providing quality programs focused in, among other areas, outreach and research.

The Raggio Research Center partners primarily with the College of Education, the College of Engineering, and the College of Science faculty on the development, delivery, and evaluation of STEM education grant proposals, projects, and services. The Nevada Department of Education, Washoe County School District, and many of the rural school districts have also partnered with the RRC on STEM-related projects. In addition to its grant-funded activities, the RRC annually hosts a variety of university-related receptions, lectures, professional meetings, and K-12 student/teacher events.

Raggio Research Center Special Research Program

Dr. Cleborne Maddux is a Foundation Professor of Counseling and Educational Psychology in the College of Education. In 2012 he continued to use Raggio Research Center office space for statistics and quantitative research design consulting with UNR students and faculty. During this year, he has met face-to-face with his clients in addition to numerous email and telephone consultations. We are delighted to have Dr. Maddux use our facility for these important services.
Support Staff

**Rod Case—Principal Investigator, NNELI**

Rod is an Associate Professor of TESOL in the College of Education at the University of Nevada and he is the Principal Investigator on the NNELI program. His research interests are in various aspects of inter-language pragmatics and second language acquisition. Rod has been at the University of Nevada since 2001.

**Sandra Prytherch—Project Coordinator, NNELI**

Sandra completed her MA-TESOL and became Project Coordinator of the NNELI grant in August, 2012. Sandra worked in psychiatric treatment settings and taught across a number of domains (music, eCommerce, psycho-education, gifted education) since completing a BS in Music Therapy from Elizabethtown College in 1981. Sandra and her husband are avid readers and tandem bicyclists. They are joyful parents of one daughter and human companions to one python.

**Shawn Pennell—Technology Coordinator**

Shawn began at the Raggio Center in 2005 as a Technology in Teacher Education-Nevada (TITE-N) pre-service teacher grant participant. Since then, she has worked at the RRC in a variety of capacities and now serves as Technology Coordinator for the NNELI grant. Shawn received her dual degree B.A. in political science and international affairs in 2005. She earned her M.A. at the UNR College of Education in Curriculum, Teaching, and Learning in 2009. Shawn is a woman of faith and the proud wife of David, and proud mother of two amazing kids- William and Esther.

**Janice Neal—Accounting Assistant III**

Jan began working for the state of Nevada in 1982, serving at Special Children’s Clinic, SIIS, Welfare, Community Connections, and USAC at UNR. She joined the Raggio Research Center team in 2004 as Fiscal Grant Manager. She and her husband, Marvin, are the founders of Sierra Nevada Teen Ranch, the focus of which is the well-being and development of at-risk youth in Washoe County.
Graduate Research Assistants

Timothy Kiley

Tim started at the RRC in August 2011 and will continue through the end of the EPSCoR Grant in August 2013. His main charge is to oversee teacher training for the eight Washoe County teachers who participated in the 2012 Summer Institute on Climate Change for Teachers. Tim is working toward a Masters Degree in Metallurgical Engineering under Dr. Thom Seal. After earning two undergraduate degrees in the natural sciences in 1992 and a Masters Degree in Education from USC in 1994, Tim taught in L.A. City Schools for ten years. During an eight-year “sabbatical”, he started two organic farms back east; drove a long-haul truck for a year; and helped a friend open a restaurant in Reno.

Nicole Casillas

Nicole earned a B.A. in Psychology from California State University, Dominguez Hills graduating Cum Laude. She also earned a M.A. in Educational Psychology from California State University, Northridge graduating with Distinction. Nicole is currently pursuing a PhD in Special Education & Disability Studies. In addition, Nicole is a 2012-2013 Nevada Leadership Education in Neurodevelopmental and Related Disabilities (NvLEND) trainee. When not working on her studies, Nicole spends her time with her husband and children. Nicole worked in the RRC on NNELI from August 2012-February 2013, when she left to focus on her doctoral studies and family.

Undergraduate Student Workers

Brittney Timmons

Brittney began working for the Raggio Research Center in September, 2009. Brittney is currently working on the NNELI Program. She will be graduating in May 2013 with her B.S. in Education in Human Development and Family Studies. Brittney plans on attending graduate school at UNR in Fall 2014 in HDFS.

Jeffrey Bouchard

Jeffrey started working at the Raggio Research Center in the Fall of 2012 for the NNELI grant. He is in his first year of study, working toward a degree in Computer Science and Engineering. Jeffrey is also an Eagle Scout in the Boy Scouts of America.
Grants and Project Summaries

Nevada Educators Really Doing Science (NERDS)

The NERDS program was a twelve-year grant–funded professional development project that started in 2000 and focused on teaching science through inquiry. The funding for the final year, which ran through August 31, 2012 is $269,338.00. More information about NERDS can be found on its website at:

http://www.unr.edu/nerds

Newton Network

The Newton Network finished its seventh year of operation, providing science education resources and professional development opportunities to Nevada’s K-12 community. Funding for each year of the Newton Network, on average, has been $15,650. More information about the Newton Network can be found on its website at:

http://www.unr.edu/newton

Nevada EPSCoR

EPSCoR is a five-year grant running through September 2013. EPSCoR has six components focusing on global climate change throughout the state of Nevada totaling $15,000,000. The Raggio Research Center’s part of the grant just completed year four, providing professional development for middle and high school teachers in Washoe County. This piece of the project has a five year budget of $176,833.06. More information about the RRC’s portion of the EPSCoR grant can be found on its website at:

http://www.unr.edu/epscor

Northern Nevada English Learning Initiative (NNELI)

Northern Nevada English Learning Initiative (NNELI) is a five year grant running through April 30, 2017 for a total grant amount of $1,935,167. UNR is working in consortium with Washoe County School District to provide specific English as a Second Language (ESL) training for undergraduates to procure an ESL Endorsement with STEM and sheltered instruction methods (SI) training as part of their undergraduate teacher licensure program at UNR. More information about the NNELI program can be found on its website at:

http://www.unr.edu/nneli

State of Nevada Technology Needs Assessment (STNA)

The 2012 State Technology Needs Assessment (STNA) is a biennial research publication to the Nevada Commission on Educational Technology and the Nevada Department of Education. The STNA is a summary of data collected over a period of several weeks using web-based surveys for teachers, technology coordinators and parents of the 17 school districts in Nevada. The RRC completed the 2012 STNA with a financial allotment of $10,000. The 2012 STNA Report can be accessed on our website at:

http://www.unr.edu/raggio-center/reports
The Nevada Educators Really Doing Science (NERDS) project is a graduate-level professional development program in inquiry-based science offered through the Raggio Research Center. The framework for NERDS includes two days of pre-session training, a week of field-based inquiry research, and one day of post-session follow-up. NERDS is dedicated to helping teachers develop their skills in teaching science through the process of inquiry. Using the NERDS framework, teachers:

- increase their content knowledge in science
- increase their skills in using technology
- experience hands-on training with the inquiry process
- conduct and report on authentic inquiry-based research
- create a science inquiry experience lesson plan for their classrooms

The time in pre-sessions is invested in building a foundation in science inquiry including measurement, journaling, representing data, and experimental design. In addition, grant staff train participants in the use of technology tools and applications such as using data collecting devices, data analysis and basic statistics. The 2012 NERDS field-based experience took place in Plumas County, California; participants used the inquiry method of science learning to discover the ecology of the Feather River. The NERDS grant recruited content experts Dr. Jennifer Hollander and Dr. Jeffrey Baguley from the Biology Department at the University of Nevada to teach content, suggest research topics, model sampling techniques and provide invaluable information and assistance to groups as they worked on research projects. Time in the post-session focused on aspects of implementing inquiry in the classroom such as assessment of the inquiry process, sharing unit plans, grade-level curriculum connections, and developing strategies for application of the NERDS experience in the classroom.

In 2012, participants earned three graduate credits for a letter grade. The NERDS grant paid 100 percent of the tuition costs for each participant. NERDS also provided content and instructional books and supplemental materials for all participants including a Garmin GPS device. As always, participants gave the NERDS experience high evaluative remarks.
The Northern Nevada English Learning Initiative (NNELI) program is a National Professional Development grant program funded by the United States Department of Education. The grant was fully funded in May, 2012 by the Office of English Language Acquisition of the United States Department of Education. It is expected to continue for five years, with a total grant award of almost two million dollars ($1,935,167.)

NNELI’s purpose is to improve instruction to English Learners (ELs) by providing professional development opportunities for pre-service and classroom teachers as well as paraprofessionals in Northern Nevada. The grant will assist with tuition for four classes leading to an ESL endorsement for pre-service teachers as well as 2 additional courses— one in Sheltered Instruction in Science, Technology, Engineering, and Mathematics (STEM) and the other in Academic Language in STEM.

Classroom teachers will also receive graduate credit for taking the 2 STEM-related courses, but must already hold an ESL endorsement.

Paraprofessionals in WCSD working with ELs will be recruited beginning in year 2 for nine free online modules that will serve their specific needs in the classroom.

Tuition assistance includes payment of per-credit, In-State registration fee, and surcharge; students are responsible for all other per-credit mandatory and Out-of-State tuition charges. The Northern Nevada English Learning Initiative (NNELI) will also help cover the costs of texts for NNELI courses.

To learn more about the NNELI program, please visit our website at:

http://www.unr.edu/nneli
The Nevada Infrastructure for Climate Change Science, Education, and Outreach, part of the Experimental Program to Stimulate Competitive Research (EPSCoR) Education Component is in its fifth and final year of operation. This program is funded by the National Science Foundation (NSF) and the Nevada System of Higher Education (NSHE). Nevada EPSCoR provides a statewide interdisciplinary program that stimulates transformative research, education and outreach on effects of regional climate change on ecosystem resources and supports use of this knowledge by policy makers.

The program partners with UNLV and NSC to implement climate change research in upper elementary, middle school and high school grades, utilizing 14 Nevada teachers in two, two-week summer institutes in both Las Vegas and Reno each year. Educators work with scientists and are offered three graduate credits each summer through the College of Science. Past participants have had the opportunity to work with regional scientists on water resources in Nevada and climate change. This year, participants have focused on local disturbance regimes and climate change interactions. The summer institutes provide the framework for EPSCoR’s educational arm. The focus of the institutes comes directly from two essential questions outlined in the original grant proposal which took effect in 2009. The first essential question directing the yearly Summer Institutes: How will climate change affect water resources and linked ecosystem resources and human systems? The second essential question: How will climate change affect disturbance regimes [e.g., wild land fires, invasive species, insect outbreaks, droughts] and linked systems? During the 2012 institute, participating teachers studying disturbance regimes visited several area field sites and met with local and regional researchers and community professionals. During the experience, participants discussed disturbances found in our region and their interactions under the larger, overarching theme, climate change science. In the fall, the teachers designed, implemented and reported on a classroom lesson plan aligned with state standards that combined elements of climate change science and disturbance regimes.

For the 2012 Summer Institute EPSCoR Education coordinators were able to add an eighth teacher to the program. Field trips included a day studying the Truckee River system with members of the Truckee River Flood Authority, a major fire site exploration near Western Nevada College in Carson City, a full day at the Desert Research Institute and a full-day excursion to the Sierra Nevada area north of Reno for a complete presentation on all aspects of disturbance regimes, four trips in all during the first week. The second week saw an intensive two days in the Raggio Research Center classrooms learning new laboratory activities. Lecture-presentations by EPSCoR staff focused on the 5-E model of science teaching and inquiry-based learning. The teachers spent two more days in the field day in the high Sierra studying wildfires and disturbance, and locally studying Reno’s Caughlin Ranch fire of 2011. Also during the second week, the Institute hosted visiting presenters from UNR’s Mining Engineering Department, Department of Natural Resources and Environmental Science, Computer Science and Engineering on the days that they did not go to the field. To round out the program, participants attended follow-up meetings and created and delivered a lesson plan based on their knowledge acquisition and experience in all topic areas from the institute during the fall months.
The 2012 State Technology Needs Assessment is a biennial research publication to the Nevada Commission on Educational Technology and the Nevada Department of Education. The research was conducted and compiled by Dr. Jacque Ewing-Taylor, Shawn Pennell and David Brackett and was funded by the Nevada State Legislature. The State Technology Needs Assessment (STNA) is a summary of data collected over a period of several weeks using web-based surveys for teachers, technology coordinators and parents of the 17 school districts in Nevada. The findings from the STNA are used when making budgetary decisions for technology purchases, upgrades, and diversification in Nevada’s K-12 schools. The technology assessed includes age and numbers of teacher and student computers; essential infrastructure such as T1 lines and necessary hubs and switches for Internet connections; and effectiveness of professional development for teachers across the state. The STNA also collected information about where counties receive funding for technology such as through state funding, grants, and bonds.

All teachers in a given county were given the opportunity to complete a 39-question survey— the same questions as 2008 and 2010 survey. The number of surveys completed by teachers was 4,509 (2,924 were from Clark County and 418 were from Washoe County). Completion rates ranged from 57.5% to 100% completion, with an average of 77%. The research team sampled responses from Clark and Washoe counties in a way that preserved elementary, middle and high school population ratios based on the estimated number of teachers in each county. The research team included all responses from all other counties to maintain statistical integrity. The overall sample was 2,019 completed teacher surveys. Each county technology coordinator was given a 25-item web-based questionnaire to complete. Sixteen out of 17 coordinators responded. With the help of superintendents, principals, and the Nevada Parent Teacher Association (NVPTA), a 7-item parent survey was sent throughout all counties which included questions about demography, technology expectations, and open-response comments. 2,626 respondents completed the survey.

In addition to the web-based (and in some cases, paper-based) surveys, other data sources included the State Educational Technology Plan, district technology plans, technology related resources from other states, the Nevada Educational Technology Survey, and related research publications where applicable. The report assessed current district technology plans and noted where changes had been made against those technology plans in 2010. Additionally, current state and national initiatives were summarized to include Nevada's involvement and projected readiness to meet those initiatives such as the Smarter Balanced Assessment Consortium (SBAC), computer-based testing in Nevada, one-to-one laptop, use of digital textbooks, and statewide Internet use in the classroom.

To view the summary of the 2012 STNA, please visit our website at:

http://www.unr.edu/raggio-center/reports
RRC Past Projects

Roadside Heritage Project

The Roadside Heritage Project was a three-year grant, running from February 2007 to April 2010. Total funding for the duration of the grant was $2,501,237, split between three collaborative partners. By integrating science, history, and modern technology, Roadside Heritage gives tourists and locals alike the opportunity to enjoy the Eastern Sierra region in a unique way. You can obtain more information about the Roadside Heritage Project and download the audio stories from its website at:

http://www.roadsideheritage.org

Pathways to Aviation

The Pathways to Aviation grant was a two-year grant that started in December 2008 and was extended and ran through January 2012. Total funding for the duration of the grant was $10,000. This grant funded the startup of the University of Nevada Aero Club, a sanctioned student club of the Associate Students of the University of Nevada (ASUN), as well as an aviation-related speaker event each spring which is open to the public. You can obtain information about the Pathways to Aviation funding source, the Reno Air Race Association, at its website:

http://www.airrace.org

The Earth As a Classroom (TEAC)

The Earth as a Classroom (TEAC), was a teacher professional development course designed to engage participants in a rigorous, in-depth study of Earth science in a professional learning community. The course focused on active tectonics, seismicity, and related geology. The field experience began at Lake Tahoe, moved on to Fallon and the Dixie Valley faults, and then headed south through the Walker Lane fault zone, ending up in Mammoth Lakes, CA. The focus of the program was on map reading, recognition of land forms and fault types, and an overview of the forces and events that shaped the Eastern Sierra Region. The Earth as a Classroom was funded by the Nevada Collaborative Teaching Improvement Program (NeCoTIP) and was a collaboration between the Raggio Research Center and the Nevada Seismological Network. TEAC provided this professional development in Earth science from 2006 to 2007.

Network for Earthquake Engineering Research (NEESR)

NEESR was a five-year grant, of which the Raggio Research Center played a three-year part, running from 2008 to 2010. Total funding for the duration of the grant was $52,458. The Raggio Research Center’s portion of the NEESR grant concentrated on engineering outreach among K-12 students. In partnership with the Dean’s Future Scholars (DFS) program through the College of Education, middle school and high school students from the Reno area participating in DFS were invited to attend one of five, week-long engineering camps held on the UNR campus. You can obtain more information about NEESR from its website at:

http://nees.unr.edu
Raggio Research Center’s Available Services

- Assessment and evaluation services.
- Support for quantitative and qualitative research analysis.
- Assistance and consultation with development of educational research and grant-related opportunities, including development of the education portion of grant proposals to fulfill requirements of funding agencies.
- Operational and logistical support for outreach, teacher professional development or other activities that may occur off campus, on campus, or within the large (more than 6,000 square feet) RRC facilities. The facilities include two 890 square-foot classrooms, a 150 square-foot conference area, and a large multipurpose area with a smart podium and projection screen. A smart computer lab with video editing capabilities is also available for grant funded activities or trainings.

To learn more about how the Raggio Research Center can support your proposed research and/or outreach projects, please visit our website:

http://www.unr.edu/raggio-center

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