RAGGIO RESEARCH CENTER SUMMARY &
2011 ANNUAL REPORT
Message from the Director

Jacque Ewing-Taylor

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.

This past year has been busy and productive, and the RRC staff has changed, as some moved on, whether through graduation or by pursuing opportunities in other areas of the university. 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.

By promoting professional development of educators in STEM fields, increasing students' awareness of those fields, providing educational outreach for local and state scientists, and evaluating these programs, we strive to have a positive impact on STEM literacy in Nevada.

The Raggio Research Center has as its mission the advancement of the theory and practice of STEM Education focusing on underrepresented groups. We accomplish this mission through research, development, instruction, dissemination, leadership, and outreach.

We hope that this report encourages 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.
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 Director since his retirement in June 2009.

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. 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 Use**

Dr. Cleborne Maddux is a Foundation Professor of Counseling and Educational Psychology in the College of Education. In 2011 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 34 different people in addition to numerous email and telephone consultations. We are delighted to have Dr. Maddux use our facility for these important services.
Shawn Pennell– Project Coordinator
Shawn began at the Raggio Center in 2005 as a Technology in Teacher Education-Nevada (TITEN) pre-service teacher grant participant. Since then, she has worked at the RRC as a computer lab attendant, graduate research assistant, project coordinator for the award-winning Nevada Pathway Project, and now on the NERDS and Newton Network grants. Shawn received her dual degree B.A. in political science and international affairs in 2005. She earned her M.A. at the College of Education in Curriculum Teaching and Learning in 2009. Shawn and her family are serendipitously committed to living a life that incorporates technology and 21st century skills.

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.

Timothy Kiley– Graduate Research Assistant
Tim took over the position as EPSCoR Education Coordinator in August 2011 and will continue through the end of the EPSCoR Grant. His main charge is to oversee teacher training for the seven Washoe County teachers who participated in the 2011 Summer Institute on Climate Change for Teachers. Tim is working toward a PhD in Science Education under Dr. Michael Robinson. After earning a Master’s 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. In his spare time, Tim does gymnastics at his outdoor home gym, backpacks in the High Sierra, plays Frisbee and enjoys the company of his two Chihuahuas, Tucson and Peru.
Samantha Label—Webmaster

Sam began work with the Raggio Research Center in 2003. She has been employed in the RRC as a student worker, graduate assistant, and now as temporary faculty, working to build and maintain the center’s web presence in all three positions. Sam received her B.A. in French in 2004 and an M.A. in Teaching English to Speakers of Other Languages (TESOL) in 2007. She has a passion for technology, gaming, and linguistics. Sam moved to Albuquerque, NM in February of 2011 and continues to maintain the center’s website from there.

Brittney Timmons—Undergraduate Student Worker

Brittney began working for the Raggio Research Center in September of 2009. Brittney is the student coordinator for the NERDS program. She is currently majoring in Human Development and Family Studies and is planning to graduate with her Bachelor of Science in the fall of 2013. She changed her major to Human Development and Family Studies after enrolling in an HDFS class at UNR with Professor Conte and becoming very excited with the program. After she completes her degree in HDFS, Brittney plans on going to graduate school to receive her Master’s Degree and become a counselor.

Cassandra Melancon—Undergraduate Student Worker

Cassandra came to work for the Raggio Research Center in April of 2010 for the Newton Network, writing a monthly newsletter for Nevada educators. Her work helps promote STEM education in Nevada’s classrooms by providing teachers with classroom resources. She also manages the Newton Network Facebook page. Cassandra is working toward her Bachelor of Science in Business Administration with a major in Accounting and a minor in Mathematics. She will be graduating in May 2012 and will be pursuing her CPA license. She is a member of Beta Alpha Psi and the Nevada Society of CPAs. She loves animals, reading and cooking.
Grants and Project Summaries

Nevada Educators Really Doing Science (NERDS)
The NERDS program is an eleven-year grant-funded professional development project that started in 2000 and focuses on teaching science through inquiry. The funding for NERDS 11, which runs through August 31, 2012 is $269,338.00. More information about NERDS can be found on its website at:

http://www.unr.edu/educ/raggiocenter/nerds

Newton Network
The Newton Network is currently in its sixth 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/educ/raggiocenter/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 three, 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/educ/raggiocenter/epscor

Nevada Pathway Project
The Nevada Pathway Project is a two-year grant running from September 2009 to June 2011. Pathway focused on providing professional development for K-12 administrators in the effective use of educational technology. Total funding for the duration of the grant was $90,000. More information about the Pathway Project can be found on its website at:

http://cpdmoodle.ccsd.net/pathway
The Nevada Educators Really Doing Science (NERDS) program is a graduate class offered through the Raggio Research Center. NERDS combines a focus on professional development in science teaching with research in science education. NERDS is dedicated to helping teachers develop their skills in teaching science through the process of inquiry.

Participants earn six graduate credits for a letter grade. The NERDS grant pays 100 percent of the tuition cost for each participant. NERDS also provides books and supplemental materials for all participants. For the eleventh year of the NERDS grant, the Raggio Research Center invited past participants to sign up for their second year of the project to complete a more in-depth course in Newport, OR. After the teachers had been accepted into the NERDS program, they attended one pre-session at the Raggio Research Center. The pre-session prepared participants to go into the field with a shared understanding of the inquiry process.

In June 2011, NERDS took 18 participants on the field experience to Newport, OR. NERDS participants and staff spent seven nights and eight days on location. Participants were driven around in rental cars. Each rental vehicle is driven by a NERDS staff member called a “van leader.” Van leaders are experienced master teachers that assist the participants throughout the week and grade their course work. The field experience portion of the course takes teachers away from familiar ecosystems near their hometown into unfamiliar territory where they must start their learning from scratch, similar to what their students must experience every time a new concept is taught. Teachers learn skills such as orienteering, sampling methods, and using keys to identify organisms, which support the science inquiry process. For year eleven, NERDS recruited Dr. Jeffrey Baguley from the Biology Department at UNR to attend the trip as a content expert. Dr. Baguley is a Marine Biologist and assisted the NERDS staff in teaching participants about the ecology of the Oregon tide pools.

Upon returning home, teachers submitted individual reports of the small group investigations they conducted in the field. They also plan and carry out a science inquiry experience in their respective classrooms. Two post-sessions focus on assessment of the inquiry process, sharing unit plans, grade-level curriculum connections, and developing strategies for application of the NERDS experience in the classroom.
Newton Network

The Newton Network is an organization funded by a Nevada Department of Education Mathematics and Science Partnership grant that provides Nevada’s educators with information and resources on grants, lesson plans and activities, and professional development. The Newton Network staff members are dedicated to serving the teachers of Nevada by connecting them with higher education professionals and providing them with classroom support and resources.

The Newton Network has several ways to get information out to teachers who need it. On the Newton Network website (http://www.unr.edu/newton), teachers are able to find professional development opportunities, lesson plans, classroom activities, and higher education contact information. Every listed resource is vetted to ensure its value and that it contains worthwhile information. The Newton Network also provides a free monthly e-newsletter that is sent to contact teachers and supporters across the state. The newsletter informs teachers about upcoming opportunities for them and their students, such as workshops and summer camps. Each newsletter delivers relevant topics relating to STEM education and provides ideas for lesson plans. Though the newsletter is emailed to teachers, it is also posted on the Newton website along with past newsletters to be accessed by teachers whenever needed.

The Newton Network began actively expanding its contacts two years ago with a mailing of a flyer, brochure, and an introductory letter to school principals. The program was able to gain 22 contacts, mostly in rural schools which had not previously been exposed to the Newton Network. The program has also expanded its contact list to include the deans of Nevada’s major institutions and research facilities. Multiple schools were contacted by phone to speak with math and science teachers directly about the Newton Network. The Newton Network was able to gain a few more contacts by this method.

In the summer of 2010, the Newton Network expanded its outreach to teachers by creating the Newton Network Facebook page, which builds on the resources provided by the website and newsletter. The Facebook page includes features not available on the website. One new section is the event calendar, which enables teachers to see upcoming deadlines and dates all at once. Each event also has a brief description and links to more information so that teachers do not have to reread past newsletters to find the information they need.

Finally, the Newton Network is improving the communication with and among teachers by offering a discussion board on the Newton Network Facebook page. For privacy reasons, the Newton Network website does not allow for teachers to contact each other directly or to ask questions and receive multiple replies. The Facebook page gives teachers the option of connecting with peers and exchanging ideas and advice. The Newton Network’s staff consists of three consultants, Shawn Pennell, Robert Newbury, and Michael Leverington, and an undergraduate student, Cassandra Melancon, acting as the lead research and development person. In April 2010, Cassie was hired to take over the tasks of researching and writing the monthly newsletter.
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 fourth 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. The focus of the institutes comes directly from two essential questions outlined in the original grant proposal. The essential question directing the 2009 Summer Institute was: How will climate change affect water resources and linked ecosystem resources and human systems? The 2010 Summer Institute was directed by 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 2010 institute, participating teachers 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 with climate change science. In the fall, participating teachers will design, implement and report on a classroom lesson plan aligned with state standards.

The 2011 Summer Institute revisited the first essential question by expanding upon the topics surrounding water resources through the lens of climate modeling, ecological change and climate change through geologic time for the seven participating teachers. Field trips included two water treatment facilities, the local hydroelectric power generating station, a full day at the Desert Research Institute and two environmental excursions at Lake Tahoe’s Sierra Nevada College campus (The Tahoe Center for Environmental Sciences’ Research Center and Demonstration Gardens) and a day in the desert studying the ancient Lake Lahontan and Pyramid Lake. We also had visiting presenters from UNR’s Academy for the Environment, Mining Engineering Department, Department of Natural Resources and Environmental Science, Computer Science and Engineering here in the classrooms on the days we did not go to the field. As in the other institutes, participants will attend follow-up meetings and create and deliver a lesson plan based on their knowledge acquisition and experience in all topic areas from the institute during the fall months.
The Nevada Pathway Leadership Project is an online professional development project to aid administrators in supporting teachers who participate in the lead project—Pathway to Nevada’s Future. It is currently being administered by Shawn Lady Pennell, an administrative faculty member in the Raggio Research Center. The Pathway to Nevada’s Future Project is funded by the American Recovery and Reinvestment Act (ARRA), in order to develop and implement a technology professional development program to train Nevada middle school teachers in 21st century skills and education to meet the needs of their 21st century students. The grant funds were also used to purchase technology equipment for participating schools: a classroom set of laptops and iPods. The Nevada Pathway Leadership Project provides professional development to train administrators in the skills they need to effectively integrate the technology and ultimately change their schools to increase student engagement.

Participants come from 60 schools across Nevada. Each site involved has two teachers who share equipment and a supporting administrator. There are 180 total participants. Teachers are trained in the use of Web 2.0 tools and a variety of student uses for the iPod Touch, and create lesson plans that reflect best-practices in incorporating technology.

Participants learn the pedagogy of a technology-rich classroom and create lessons that foster higher-order thinking skills. To this end, they need supportive administrators who have positive attitudes toward technology in education. Participating teachers need both the freedom to experiment with the technology and someone who can effectively evaluate teacher lessons and observe levels of student engagement. These are the objectives of the Pathway Leadership Project: to improve administrator attitudes and policies toward technology and to provide professional development that trains administrators in how to support their 21st century teachers.

**The Pathway Leadership Project creates online professional development that:**

- Builds 21st century education knowledge and skills.
- Trains in the use of the iPod Touch for classroom evaluations and observations.
- Discusses how to collaborate and communicate with colleagues in online learning communities.
- Challenges the current paradigm of technology acceptable use policies.
- Explores the use of Web 2.0 tools and other Internet resources for expanding the repertoire of school administrators.
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, but the timeline has been extended until January 2012. Total funding for the duration of the grant is $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

State Technology Needs Assessment (STNA)

The STNA was an eight-month grant running from November 2009 to June 2010. Total funding for the duration of the grant was $10,000. In 2010, the Raggio Research Center for STEM Education was contracted by the Nevada Department of Education (NDE) to conduct a Statewide Technology Needs Assessment (STNA). The purpose of this assessment is to identify the current state of district and state technology plans, recognize the current capacity of schools across the state and how this impacts the achievement of Nevada students, measure the level of preparedness among Nevada teachers to integrate technology into their classrooms, and identify educational technology strategies that are being utilized across Nevada and how the implementation of these strategies in the classroom setting can be improved. The STNA report is available online for viewing at: http://www.doe.nv.gov/Technology/Resources/2010_STNA.pdf

Network for Earthquake Engineering Research (NEESR)

NEESR is a five-year grant, of which the Raggio Research Center plays a three-year part, running from 2008 to 2010. Total funding for the duration of the grant is $52,458. The Raggio Research Center 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/educ/raggiocenter