A Team Teaching Approach to Improving Climate Change Science in Nevada Middle Schools

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Abstract

The NSF EPSCoR RII Climate Change Infrastructure Award includes a small but important effort to build educational infrastructure among in-service middle school science, math, and English teachers at six Nevada middle schools. We will focus on whole school or whole grade-level approaches, often referred to as a “professional learning community” or “community of practice” model, engaging a cohort of teachers at selected schools. Using specific elements of Nevada climate change research themes particularly relevant to each local community, this project will create a magnet school in one of the proposed themes at each school. The themes will be guided by the Nevada state science teaching framework and national science teaching standards. Target schools have student populations 50% or more minority and the proportion of science classes taught by teachers considered not highly qualified is above the school district mean. The use of graduate students to act as mentors and content links to in-service teachers will help develop a science research community that includes NSHE and middle school teachers working together.
Elements of the program

- Recruit teams of 3-5 middle school teachers from ~6 schools
- Provide on-line lower division college class in climate change science fundamentals
- All team members participate in a 2-week long summer institutes for 2 consecutive summer
- Each team had access to a disciplinary GRA who must assist teams in developing climate change science content
- School year field trips, mentoring, and assistance with development and implementation of 3-5 lesson plans in class
Who is involved?

- Paul Buck, DRI/NSC
- Jacque Ewing-Taylor, STEM Raggio Venter UNR
- Larry Rudd, School of Education NSC
- Juan McAlister, Asst. Program Manager NSC
- Maggie Newman, Dell Webb MS
Recruitment

- Seeking 6 teams of 3-5 middle school teachers; at least one member (and preferable 3) teach middle school earth science
- In CCSD this is 7th grade; in WCSD this is 6th grade
- School selected must agree (if not already doing this) to use a "team teaching" approach—that is, core disciplinary teachers must have the same cohort of students
- Teams may also have ELA, math, social studies teachers
- Schools commit to 5 years of the program—teachers who leave the school will be replaced by other teachers who then go through our training
On-line class

- Many (most?) middle school teachers—even the ones teaching earth science—have little formal preparation in fundamentals of climate change science
- UNLV will provide an on-line course (course number TBD) with lower division content to provide a baseline of content for all teachers in the teams
- Textbook is likely to be Arnold Bloom
- Teachers will have the tuition and fees paid by the program
All team members will take a 2 week summer institute (Las Vegas or Reno) using on-line course content coupled with effective pedagogy to develop lesson plans/units specific to their teaching fields.

3 graduate credits will be given for each Institute (GEOG 691 through UNR).

Lesson plans/units will be inquiry-based and meet Nevada State science teaching framework guidelines and school district curriculum requirements.

No new curricula will be developed—rather, will use existing curricula to create effective lesson plans.
A disciplinary graduate research assistant (GRA) in Reno and Las Vegas modeled on the NSF’s GK-12 Fellowship program will assist local teams. They will act as an intermediary between NSHE climate change science faculty and the classroom teachers relaying current research content and methods. Insure age appropriate content in inquiry-based activities.
School year activities

- Integrated teaching teams implement lessons plans during the school year at appropriate places in their curricula.
- Regular meeting between classroom teacher, GRA, and Climate change faculty/staff to adjust curricular or pedagogy to improve instruction.
- Middle school teams will take 2 field trips rear school year of climate change science research site.
- Climate change research faculty will make at least one classroom presentation at each school.
Outputs

- Increase the number of better trained middle school teachers
- Create new locally relevant lesson plans integrating climate change science, ELA, Math and other core disciplines following State of Nevada and school district requirements
- Provide guidance to Policy group about museum exhibits, traveling science boxes and other informal science education opportunities
- Pre and post evaluations of teacher pedagogical content knowledge and use of knowledge gained the classroom
- Publication of lesson plans on data portal for teacher across the state to use
- Evidence of effectiveness of the “team teaching’ approach to middle school climate change science
Outcomes

- Create replicable professional development model of middle school climate change science delivery to be sued in Nevada and adapted for sue by other institutions.

- Strengthened relationships between middle school teachers and climate change researchers in the NSHE—expansion of the K-16 scientific research community.

- Greater teacher content knowledge and pedagogical content knowledge in climate change science and greater confidence in ability to teach effectively.

- Sustainable “Sumer Institute” program based on “taxing” future proposals for climate change research.
Timeline

- 3/1/09 Courses at UNLV and UNR established
- 4/1/09 teaching teams recruited
- 4/15/09 GRA’s selected
- 5/15/09 Syllabi prepared
- 6/3/09 On-line course starts (UNLV summer session II)
- 7/13/09 Summer Institute LV
- 7/27/09 Summer Institute Reno
- Late Aug. 2009-classes start
- 2009-10 school year
  - GRA in classes
  - Implement 3-5 lesson plans
  - 2 field trips
  - Monthly meetings
- 2nd summer Institute TBD