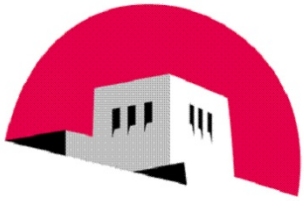
FINAL REPORT



The University of New Mexico

External Evaluator's Final Report: GK-12 E-MRGE Project

August 2010

Dan Cathey, MPA
Paul Guerin Ph.D.

Prepared for Scott Collins Ph.D., and
Laura Crossey Ph.D.

UNIVERSITY OF NEW MEXICO, INSTITUTE FOR SOCIAL RESEARCH

Table of Contents

Preface

This final report chronicles the GK-12 Ecohydrogeology in the Middle Rio Grande Environment Project (E-MRGE). The Institute for Social Research (ISR) was contracted to evaluate the project. ISR provided a progress report after each school term from 2006 through 2009. Each of these reports served as the formative evaluation of the project. This is the final report and is presented in the format required by the National Science Foundation GK-12 Program's, *Guidelines for Preparing Final Report*.

Overview of the E-MRGE Project

In 2005, the Sevilleta Long-Term Ecological Research Program (LTER), and the Sevilleta National Wildlife Refuge (SNWR) at the University of New Mexico (UNM) in partnership with the Socorro Consolidated Schools and the Belen Consolidated Schools, proposed a three-year graduate teaching project entitled E-MRGE: Ecohydrogeology in the Middle Rio Grande Environment to the National Science Foundation (NSF). In 2006, UNM received funding from NSF for the project.

The overarching vision of the E-MGRE stakeholders, as described in the NSF grant application, was to build links and collaborations between UNM and teachers in two rural communities in New Mexico. By building such connections, they hoped to create a more enlightened public, improve formal and informal science education, and recruit the next generation of environmental scientists. According to the application, UNM fellows were to work with middle school teachers from one school in each of the communities of Belen and Socorro, New Mexico. The application characterized the fellows rotating between the school systems and the SNWR outreach program and developing and supporting field trip activities for teachers to learn about the Sevilleta LTER. Fellows and teachers were also to develop related inquiry-based schoolyard LTER projects providing hands-on science experiences for middle school students. These projects were to help teachers meet New Mexico science standards. Teachers were also to have an opportunity to receive university credit through summer courses offered by UNM's Summer Teachers Institute. E-MRGE stakeholders anticipated the fellows would acquire enhanced teaching skills and teachers participating in the program would gain greater scientific knowledge and a supply of inquiry-based curriculum activities.

A proposed product of E-MRGE was a series of learning modules, i.e., lesson plans, for teachers. The teachers and fellows developed learning modules jointly. These materials focused on specific approaches teachers use to introduce scientific inquiry-based learning in their classrooms, with hands-on investigation, and student-directed learning, in the context of a classroom or outdoor activity. The modules included simple but innovative experiments that integrate recent advances in concepts in physical science, chemistry, and biology, and encourage critical thinking about the impacts of science on the environment and the implications of advanced scientific research on human lives. During the first two-years, fellows made strides toward building a body of classroom activities. The PI's continued to encourage the fellows to generate and document any activities,

demonstrations, or work products so they might be replicated and memorialized for future fellows and to demonstrate the benefit of the E-MRGE project. During the third year more effort was made and the PIs began putting the modules on the E-MRGE website (http://epswww.unm.edu/GK-12/).

During Year-Two of the project, E-MRGE established a relationship with the Laguna Middle School in Laguna, New Mexico and added that school to the project. The school is located on the Laguna Reservation approximately 45 miles west of Albuquerque. Four fellows were assigned to the school.

The project was to begin with seven fellows in Year-One, increasing to nine fellows in Years-Two and Three. Each fellow in Year-One and Two was to be offered up to two years of support. Graduate fellows were guaranteed a total of five years of support. While not on E-MRGE funds, the fellows were assured Teaching Assistant (TA) support. The E-MRGE program would provide flexible support should some graduate students choose to divide their time by serving as a fellow for one full year and then only during one semester of their second year. This option to serve part-time was implemented to mitigate potential issues with travel, burnout, or other time commitments. Initially, fellows were to rotate among teachers within and between school systems so teachers could benefit from the different scientific backgrounds and skills of the fellows. Through the rotational plan, each fellow would work directly and indirectly with numerous teachers throughout the year.

Table 1 shows the progression of fellows through the program. Seven fellows started the program in Year-One. Ten fellows served in Year-Two, six in Year-Three, and four fellows finished the program in Year-Four. Year-Two contained the largest number of experienced Second Year fellows. There were 15 unique fellows during the project.

Table 1. Year By Fellow's Year In The Program

	Year in Program		
Year	First Year Fellows	Second Year Fellows	Total
Year-One	7	Not applicable	7
Year-Two	4	6	10
Year-Three	4	2	6
Year-Four	0	4	4
Total	15	12	27

A. Project Goals and Methods

1.) Goals and Objectives

The E-MRGE project established six goals:

1. Develop collaborations that will improve the teaching and outreach skills of the E-MRGE fellows, and the content knowledge and its application for K-12 Teachers.
2. Enable graduate teaching fellows in disciplines related to ecohydrogeology to understand better the educational opportunities and practices of public schools.
3. Strengthen existing partnerships and create new ones among the University of New Mexico and rural school districts.
4. Provide the context for collaborations among K-12 teachers and students and fellows so everyone can better understand and contribute to interdisciplinary scientific study, as well as teaching and learning about ecology and water resources, especially focused on regionally relevant topics.
5. Actively involve K-12 teachers and students in relevant inquiry to investigate interdisciplinary ecohydrogeology questions in the Middle Rio Grande Region using the processes, skills and tools of science, technology, engineering, and mathematics (STEM).
6. Familiarize K-12 teachers and students with the literature, media, technology, and local community resources that will increase their STEM knowledge and their ability to access further knowledge.

2.) ISR Evaluation Methods

a. The general design

The evaluation was designed using National Science Foundation (NSF) evaluation methods. ISR staff implemented a quantitative and qualitative data collection method and developed an observation instrument; separate surveys for teachers, students and fellows; an instrument for fellows to report their work; and an instrument for collecting information from fellow's files.

Evaluation questions in the project description measured four functions: 1) what is happening; 2) what is working; 3) what problems are occurring; and 4) what changes should be made (if any). Specifically, the project evaluation questions were:

1. To what extent did the Fellows benefit from the experience of participating in the E-MRGE Project?

2. Did the E-MRGE Project impact middle school student interests and attitudes toward learning STEM related topics [biology and earth sciences specifically]?

3. Did the E-MRGE Project contribute to the classroom teachers' beliefs and professional development toward teaching STEM related topics?

4. To what extent can the E-MRGE Project promote the transfer of plans and technical know how to other schools (i.e., educational institutions beyond the realm of the target study)?

5. How effective were the inquiry based instructional modules in fostering student understanding and enjoyment of STEM related topics?

6. Did the Fellow's participation in the preliminary orientation session promote their abilities in being successful contributors to the E-MRGE Project?

Table 2 shows the data collection methods used during the four years of the project. ISR collected official student data on each fellow during Year-One. ISR suggested the use of work logs after Year-One and analyzed these data for two years (2008 and 2009).

Table 2 Data Collection Methods and Quantity Matrix

Method	Year and Quantity
Surveys	2007: 7 Fellows, 7 Teachers, and 49 Students 2008: 10 Fellows, 8 Teachers, and 31 Students 2009: 6 Fellows, 11 Teachers, and 56 Students 2010: 4 Fellows, 9 Teachers, and 182 Students
Observations	2007: 64 class observations, Fellow/Teacher orientation and mid-year workshop. 2008: 27 class observations, Fellow/Teacher orientation and mid-year workshop. 2009: 1 workshop, and 5 weekly meetings 2010: No workshops or meetings held
Official Student Data	2007: 7 Fellows
Work logs	2008-2009: Fellows provided work logs.

b. Summary of data collection, instruments, procedures, and tools

Surveys

In February 2007, surveys were distributed to each fellow, teacher, and approximately 140 students. The survey included questions aimed at measuring the fellow's, teacher's, and student's feelings of the importance and level of confidence to issues related to the evaluation questions. Fellows were asked questions regarding, major field(s) of study, and teaching experience. Teachers were asked about their years of employment, education level, and college major.

Students were asked questions related to their interest in science and the impact of the fellow on their learning experience. Students were surveyed each year. Data collection instruments are contained in the Appendix of this report.

Non-Participant and Participant Observation

Annually two ISR staff members attended the workshop at the SNWR, and weekly meetings during the first three years of the project. Observations by staff were framed by guidelines put forth by standards of ethnographic fieldwork in which interpersonal relationships and interactions were examined among the fellows, teachers, and students. At the school sites, the staff took observation notes and made objective descriptions of the activities. Additionally, ISR observers created analytical notes, which offered an analysis and interpretation of events and activities in the classrooms. To accommodate busy teachers and fellows, ISR observers at times interviewed teachers and fellows informally during breaks between class sessions. Comments from the fellows and teachers were included in the observer's notes. Overall, informal interviews proved useful in identifying obstacles and successes during the project. Typically, ISR observers did not participate in classroom activities so as not to influence the process and affect the lesson. However, in a few situations the ISR observers were obliged to participate when the E-MRGE fellow or the classroom teacher specifically invited the ISR observer to participate in the classroom activity. Classroom observations were discontinued after Year-Two for budgetary reasons.

Official School Data

During February 2007, ISR staff acquired the fellow's official UNM records, i.e., grade point averages, majors, etc., and teacher information including years of employment, education level, and college major. After the first year of the project, school and job information was collected directly from fellows by adding questions to the survey.

B. Evaluation Findings Executive Summary

1.) Evaluation Question Findings

Evaluation Question 1: To what extent did the fellows benefit from the experience of participating in the E-MRGE Project?

ISR compared responses of fellows experiencing their first year in the program to fellows going through their second year (Table 3). Overall, first and second year fellows reported benefiting from participating in the E-MRGE project. They agreed the project had improved their teaching ability. The overall mean rating changed from 3.2 for first year fellows to 3.4 for second year fellows. Fellows reported their teaching ability improved from the first year to the second year (3.6 first year mean, 4.3 second year mean). The Fellow's instructional content benefited from the Teachers contribution (3.5 first year mean, 3.8 second year mean). They expressed mixed opinions about the project

benefiting their communication skills. The program experience did not seem to substantively benefit the fellows understanding of their own research.

Table 3 Fellows Benefit From Project

Fellows respond…	First Year Mean (n=15)	Second Year Mean (n=12)
GK-12 has improved my teaching ability.	3.6	4.3
The GK-12 Program broadened/deepened experience this year.	3.4	3.5
Teachers contributed to better understanding of communication and presenting.	2.9	2.8
GK-12 Program has helped clarify understanding of research.	2.7	2.7
My instructional content has benefited from Teacher's contribution.	3.5	3.8

Chart 1 shows the teacher's responses regarding the quality of the E-MRGE fellows on the project. Ratings were lower at the end of Year-Four (mean of 3.4) but all teachers agreed the fellows demonstrated confidence, expertise, and good communication skills. The mean rating for the four years of the program was 4.1.

Chart 1 Teachers Sum Fellow's Abilities

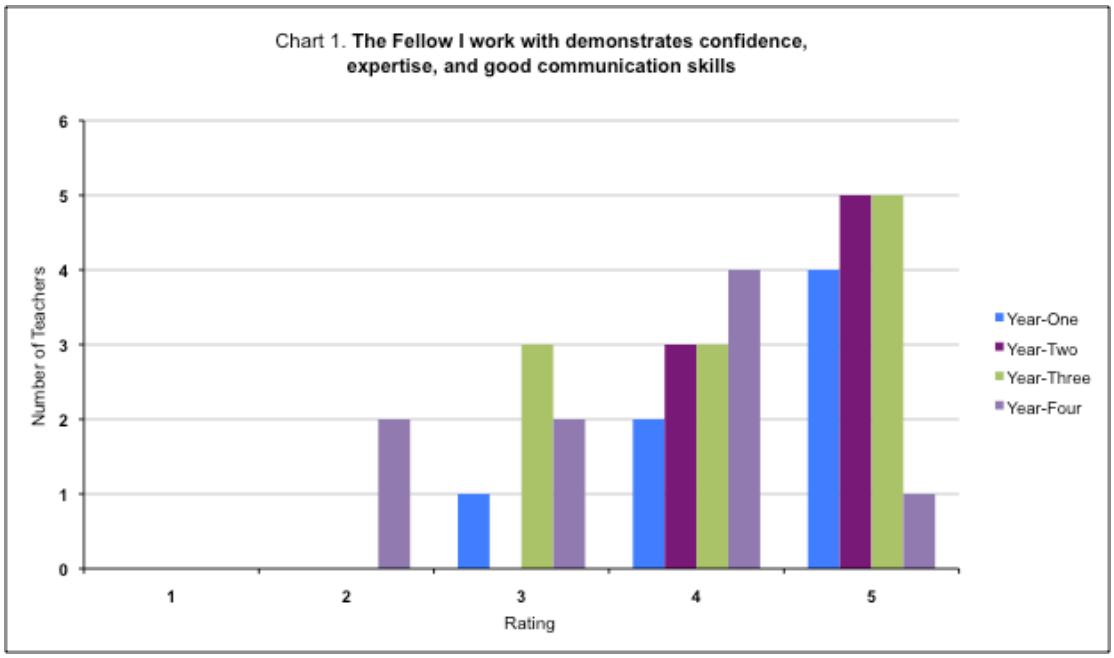


Table 4 expresses the fellow's level of confidence in their ability to use various teaching techniques to the importance of this ability and shows the difference, i.e., gap. Fellows rated the importance of using teaching techniques as moderately important and their confidence to use those techniques as slightly less. A "difference" measure is included as a measure of change since the previous years. This is the difference between the mean

confidence rate and the mean importance rate. Table 7 shows the difference measure improved for fellows from their first year in E-MRGE to their second year.

Table 4 Fellows Ability To Use Teaching Techniques, by Years in E-MRGE

Rating	First Year (n=14)	Second Year (n=11)	Difference
Mean Confidence Rate	3.3	3.5	3.7
Mean Importance Rate	3.8	3.7	3.5
Difference	-.5	-.2	.2

ISR asked the students a series of questions describing the fellow in their classroom. Table 5 shows the average response to each question. Responses were measured on a scale of 1 to 5 with 1 being "strongly disagree" and 5 being "strongly agree." The students rated the fellows high in almost every instance.

Table 5 Students Responses About The Fellows

The fellow…	Year-One Mean (n=48)	Year-Two Mean (n= 32)	Year-Three Mean (n=56)	Year-Four Mean (n=181)	Total Mean (n=317)
Speaks clearly and can be easily understood.	4.5	4.3	4.5	4.3	4.3
Challenges me to think about the subject	4.2	3.9	4.3	4.1	4.1
Makes class interesting	4.3	4.4	4.5	4.3	4.3
Asks questions that help me understand the topic	4.3	4.3	4.4	4.1	4.2
Gives clear directions about assignments	4.3	4.5	4.5	4.2	4.2
Treats me with courtesy and respect **	4.6	4.8	4.5	4.3	4.4
Is patient when working with me **	4.5	4.4	4.4	4.1	4.2
Encourages me to participate in class discussion	4.3	4.2	4.5	4.1	4.2
Helps me solve problems and do my work.	4.3	4.1	4.5	4.3	4.3
Seems to like working with me.	3.8	4.1	4.0	3.9	3.9
Works well with my teacher.	4.4	4.3	4.6	4.2	4.3
Is friends with my teacher.	4.3	4.0	4.4	3.9	4.0

** Ratings were significantly different at the .05 level from Year-One to Year-Four

To what extent did the fellows benefit from the E-MRGE project? Survey responses from the teachers, fellows, and students indicate the fellows benefited from the project. Their educational experiences were enhanced and their communication and teaching skills seemed to have improved. The opportunities to teach, present information, and direct experiments seemed to have an impact on the fellow's improved communication skills.

Evaluation Question 2: Did the E-MRGE Project impact K-12 student interests and attitudes toward learning STEM related topics [biology and earth sciences specifically]?

ISR asked fellows and teachers, on a scale of one to five with five being best, if students appear to be interested in learning the scientific method, fellows and teachers gave positive responses. Fellows rated the student's interest in learning science an average mean of 3.4 over four years. Teacher's ratings of student's interest in science increased slightly from 2.9 the first-year to an average mean of 3.1 over four years (Table 6).

Table 6 Fellows And Teacher's Rating Of Student Interest In Science

	Fellow's responses				Teacher's responses			
	Year-One	Year-Two	Year-Three	Year-Four	Year-One	Year-Two	Year-Three	Year-Four
N	7	10	5	4	7	8	11	9
Mean	3.1	3.3	3.0	4.5	2.9	3.1	3.3	3.0

Table 7 shows the confidence and importance the fellows placed on the topic of developing students' interest in science. The results show the fellow's confidence changed only slightly in their ability to develop the student's interest in science. In Year-Three, the fellow's confidence in developing student's interest exceeded the importance they gave the topic, but in Year-Four the fellows rated their confidence lower than the importance of the topic.

Table 7 Fellows Responses To Developing Student Interest

Rating	Year-One Mean	Year-Two Mean	Year-Three Mean	Year-Four Mean
Mean Confidence Rate	3.7	3.4	3.7	3.6
Mean Importance Rate	3.9	3.9	3.5	3.8
Difference	-.2	-.5	.2	-.2

ISR asked students to describe their attitude about science. Students had a positive attitude about science. For each question, student's described their attitudes at virtually the same positive level for four years (Table 8). The total mean for the four years of the program is given in the far right column.

Table 8 Students Attitudes About Science

Students think…	Year-One Mean (n=49)	Year-Two Mean (n=32)	Year-Three Mean (n=54)	Year-Four Mean (n=184)	Total Mean (n=319)
Science is very interesting.	4.2	4.2	4.3	4.3	4.3
It is important for me to know about science in my daily life.	4.2	4.1	4.4	4.2	4.2
Boys and girls can be equally good at science.	4.3	4.5	4.4	4.1	4.2
Science is useful in solving every day problems.	3.6	3.8	4.1	3.7	3.7
I am good at science.	3.7	3.5	3.9	3.7	3.7

ISR also asked the students about their interests related to education and science. Students strongly agreed they are interested in going to college. Over the four years, this

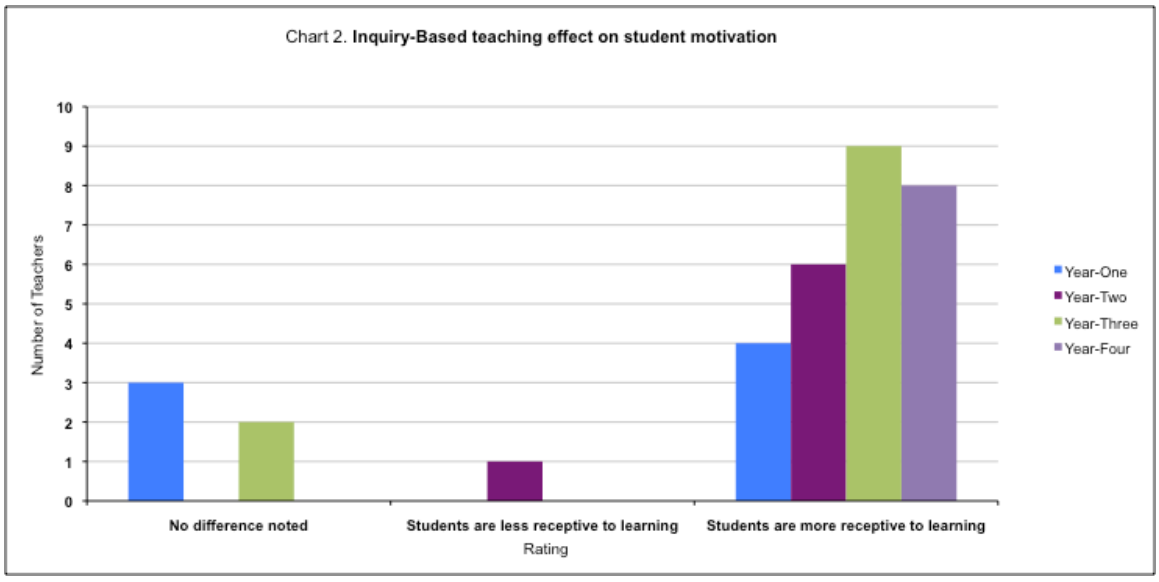
remained the highest positive response by the students in the survey. Overall, the students were interested in science and continuing their education (Table 9).

Table 9 Students Interests

I am interested in…	Year-One Mean (n=49)	Year-Two Mean (n=32)	Year-Three Mean (n=56)	Year-Four Mean (n=180)	Total Mean (n=318)
Discussing science with friends and family.	3.6	3.5	3.7	3.4	3.5
Reading articles about science in newspapers, magazines, or on the Internet.	3.4	3.8	3.6	3.3	3.4
Taking additional science courses beyond the required ones.	3.2	3.1	3.6	3.3	3.3
Going to college.	4.8	4.8	4.7	4.6	4.6
Majoring in a science-related field in college.	3.5	3.6	3.6	3.4	3.5
Joining a science club or organization.	3.1	3.6	3.1	3.0	3.1

Responses from the fellows, teachers, and students indicated the E-MRGE project might have a positive impact on the students. Teachers reported the inquiry-based teaching technique had a positive impact on students' motivation (Chart 2). The four-year mean rating for this question is 2.7. Students appear to be motivated, in part, due to the effect of inquiry-based teaching. Students had positive attitudes toward the subject matter suggesting the fellows had a positive impact on the students.

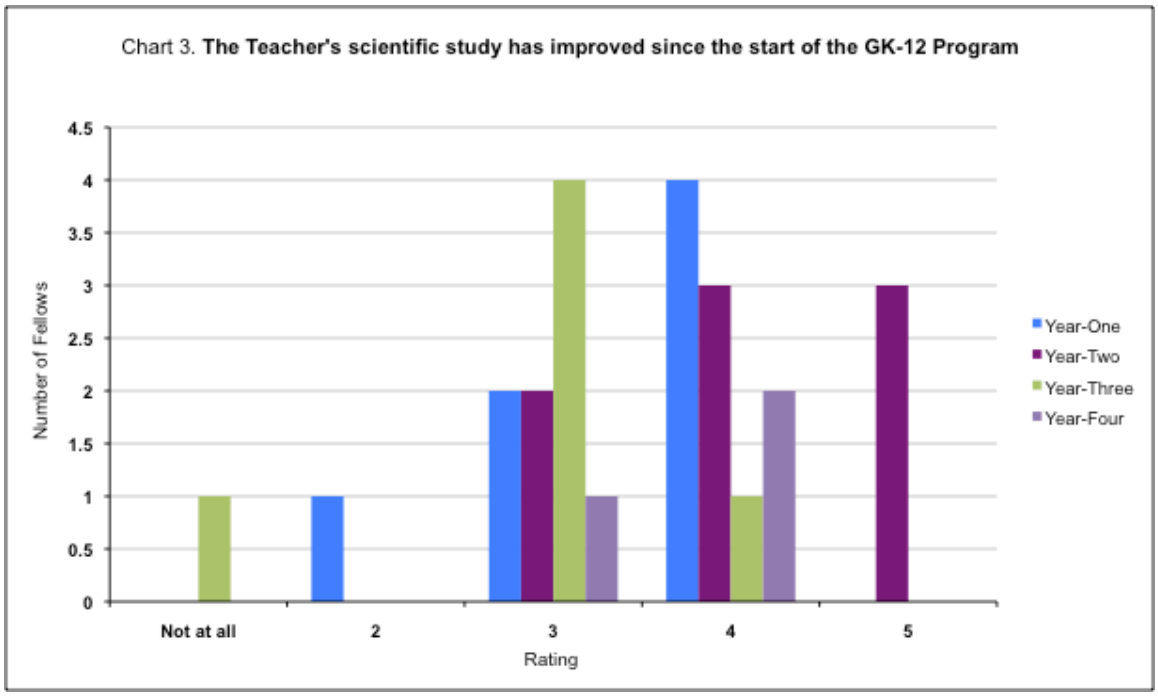
Chart 2 Inquiry-Based Teaching Effect on Student Motivation



Evaluation Question 3: Did the E-MRGE Project contribute to the classroom teacher's beliefs and professional development toward teaching STEM related topics?

In Year-Two, the fellows generally agreed that the teachers' scientific study had improved since the E-MRGE project was introduced (Chart 3). In Year-Three, the mean average rating was 2.8. In Year-Four, the rating improved to a mean average of 3.7.

Chart 3 Fellows Response to Teacher's Improvement



Teachers were asked to indicate how confident they felt about using inquiry-based learning techniques in the classroom and how important this issue was for their students. Table 10 shows the teachers overall rating improved. Teachers felt this topic was important and use the Inquiry technique in the classroom.

Table 10 Teachers Use Of Inquiry-Based Techniques

Rating	Year-One Mean	Year-Two Mean	Year-Three Mean	Year-Four Mean
Mean Confidence Rate	2.9	2.9	3.1	3.0
Mean Importance Rate	3.9	3.9	3.8	3.6
Difference	-1.0	-1.0	-.7	-.6

Teachers think they are proficient at teaching facts, rules, and vocabulary. Over four years, the teachers rated their confidence in teaching facts higher than their perceived importance of the issue. Teachers appear confident in their abilities to teach the facts and vocabulary of science (Table 11).

Table 11 Teachers Responses To Teaching Facts				
Rating	**Year-One Mean**	**Year-Two Mean**	**Year-Three Mean**	**Year-Four Mean**
Mean Confidence Rate	3.9	3.5	3.7	3.4
Mean Importance Rate	3.4	3.3	3.3	3.1
Difference	.5	.2	.4	.3

Table 12 shows the teacher's responses to questions describing their feelings about the E-MRGE program increasing their educational experience and contributing to their understanding of science. Teachers seemed to feel the program made a positive contribution but it is unknown how much the program influenced the teachers beyond the classroom.

Table 12 Teachers Acknowledge Program Benefits					
Teacher's respond…	**Year-One Mean (n=7)**	**Year-Two Mean (n=8)**	**Year-Three Mean (n=10)**	**Year-Four Mean (n=9)**	**Total Mean (n=34)**
Participating in E-MRGE has enhanced this school year.	3.3	3.3	3.4	2.5	3.1
The Fellow has contributed to my understanding of science.	3.1	3.3	3.4	2.3	3.0

Overall, the E-MRGE program seemed to have a positive influence on the participating teachers. The fellows gave the teachers high ratings and the teachers gave themselves high ratings concerning issues related to inquiry-based learning. Each year, teachers reported they were very confident in their ability to teach facts and vocabulary. Teachers rated the benefits of E-MRGE high for the first three years.

Evaluation Question 4: To what extent did the E-MRGE Program promote the transfer of plans and technical know how to other schools (i.e., educational institutions beyond the realm of the target study)?

During the course of the program, the fellows found ways to teach science to the students outside of the classroom. During the 2007 UNM Summer Intersession, one fellow organized a summer camp at the SNWR for mid-school students from Belen and Socorro. The Camp was held for three years. The program was intended to give students the opportunity to experience the scientific process in real-like. Students wrote an application stating why they would like to get this internship and the fellows selected the 14 best applications. During the weeklong science, camp students participated in ongoing research projects, learned various field techniques, and collected data for ongoing field surveys. At the end of the week, returning students gave a short presentation to their parents about their camp experiences. Students and fellows reported the camp was a success and seemed to motivate students to learn science.

The Belen Middle School Fellows and Teachers organized the Belen Outdoor Education Program (BOEP). The first year (2007-2008) the fellows took students (approximately 7) from Belen Middle School to the Jemez, Organ, and Manzano Mountains, Carlsbad

Caverns and the White Sands Monument in New Mexico to explore the geology, flora, and fauna of that area. The BOEP also explored the sites in the Coconino National Forest and the Grand Canyon in Arizona. During Year-Three BOEP explored the Bosque del Apache National Wildlife Refuge, the Rio Grande Nature Center, and Carlsbad Caverns, and White Sands.

The E-MRGE program Principle Investigators (PI) continued to collect class activities and projects the fellows used in their classes. They distributed the instructions of the most successful activities and projects to participant teachers and made the activities available to a broader audience using the E-MRGE website (http://epswww.unm.edu/gk-12/). The fellows shared their experiences at the 2009 "Meet and Greet" Session held in January 2009 at the Sevilleta. During the weekend, workshop fellows shared their "best" class activities with other fellows, the PIs, and teachers. The fellows also explored using outside activities to supplement the indoor classroom projects.

E-MRGE teamed with Project Venture in Laguna, New Mexico. Project Venture (PV) is an outdoor experiential youth development program designed for high-risk American Indian youth and youth from other ethnic groups. PV aims to prevent substance use and related problems through:

- Classroom-based problem-solving activities
- Outdoor experiential activities
- Adventure camps and treks
- Community-oriented service learning

The program relies on American Indian traditional values to help youth develop positive self-concept, effective social interaction skills, a community service ethic, internal locus of control, and increased decision making and problem-solving skills. PV is a highly successful after school program. PV has goals of fostering leadership and cultural values in tribal students through outdoor experiential learning. Fellows joined with PV to take Laguna students to ski Sunrise Park Arizona, hike the Sandia Mts., Mt. Taylor, and the Grand Canyon, rafting Moab Utah, and hiking in California. At Grand Canyon, the fellow illustrated classroom topics in geology, astronomy and environmental science.

The issue of supplies and materials remains an issue for E-MRGE teachers. Adequate science equipment and materials were necessary for the project to succeed and give students a hands-on inquiry-based learning experience. ISR asked teachers and fellows several questions regarding the importance of the need for supplies to make the GK-12 model succeed (Tables 13 & 14). Both groups felt that adequate supplies in the classroom are very important (4-year cumulative average of 4.5 for teachers and fellows). Teachers feel the classrooms were inadequately supplied. The fellows were not quite as harsh in their judgment of the limited supplies in the classroom. Teachers also felt the E-MRGE project probably cannot succeed without special equipment (mean of 2.8 over four years). The fellow's seem slightly more confident the program can succeed without special equipment (a four-year mean of 3.2). After four years, teachers and fellows continued to

feel they had inadequate classroom computers (cumulative mean for Teachers and Fellows of 2.1).

Table 13 The Importance Of Supplies And Equipment To Teachers

Teacher's response…	Year-One Mean (n=7)	Year-Two Mean (n=8)	Year-Three Mean (n=11)	Year-Four Mean (n=9)	Total Mean (n=35)
Adequate supplies in the classroom are important for the GK-12 program to succeed.	4.9	4.4	4.6	4.4	4.6
There are adequate supplies in my classroom to perform Standardized Tests.	2.9	2.3	3.1	3.2	2.9
GK-12 can succeed without special equipment.	2.9	2.8	2.7	2.7	2.7
I have adequate computing equipment in my classroom.	1.7	1.6	2.3	1.8	1.9

Table 14 The Importance Of Supplies And Equipment To Fellows

Fellow's response…	Year-One Mean (n=7)	Year-Two Mean (n=10)	Year-Three Mean (n=6)	Year-Four Mean (n=4)	Total Mean (n=27)
Adequate supplies in the classroom are important for the GK-12 program to succeed.	4.6	4.4	4.7	3.8	4.4
There are adequate supplies in my classroom to perform Standardized Tests.	3.0	3.8	3.5	3.5	3.5
GK-12 can succeed without special equipment.	2.9	3.6	3.4	2.8	3.2
I have adequate computing equipment in my classroom.	1.9	2.6	2.7	2.2	2.4

The BOEP, Summer Camp, and Project Venture association illustrate how the Fellows are able to take an idea, i.e., a summer camp, and fold it into their G-12 Program and the local middle school. One fellow saw an opportunity, organized her colleagues and created the summer camp event for the middle school students. The Project Venture and E-MRGE at Laguna Middle School has also merged via the fellow.

Indirectly, another example of the interaction outside the initial schools can be seen in the point-of-view the fellows had toward the equipment questions. The fellows saw that E-MRGE can succeed with limited special equipment. This might be pointing to the self-reliance and skill set the fellows possess.

Evaluation Question 5: How effective were the inquiry-based instructional modules in fostering student understanding and enjoyment of STEM related topics?

Fellows and teachers were asked about inquiry-based learning. Fellows reported having increased exposure to inquiry-based learning by the second year. Year-Three fellows

rated their exposure to inquiry low, but during Year-Four, fellows gave this question a 4.3 rating. The fellows saw inquiry learning as important and seemed to think it was somewhat effective (Table 15).

Table 15 Fellows Rate Effectiveness Of Inquiry-Based Learning

Fellow's response…	Year-One Mean (n=7)	Year-Two Mean (n=9)	Year-Three Mean (n=5)	Year-Four Mean (n=4)	Total Mean (n=25)
I have been exposed to the inquiry-based learning module.	2.4	3.3	2.4	4.3	3.0
The inquiry-based learning module is important for students.	3.1	3.7	4.3	4.5	3.8
I use inquiry-based techniques in the classroom.	3.4	3.5	3.7	4.5	3.7
Inquiry-based learning module is effective in the classroom.	3.2	3.9	3.0	4.5	3.7

Over four-years, fellows observed that inquiry-based methods improved the student's ability to perform classroom activities, teacher-made exams, and recall content (Chart 4).

Chart 4 Fellows Responses on Gains Using Inquiry-Based Teaching

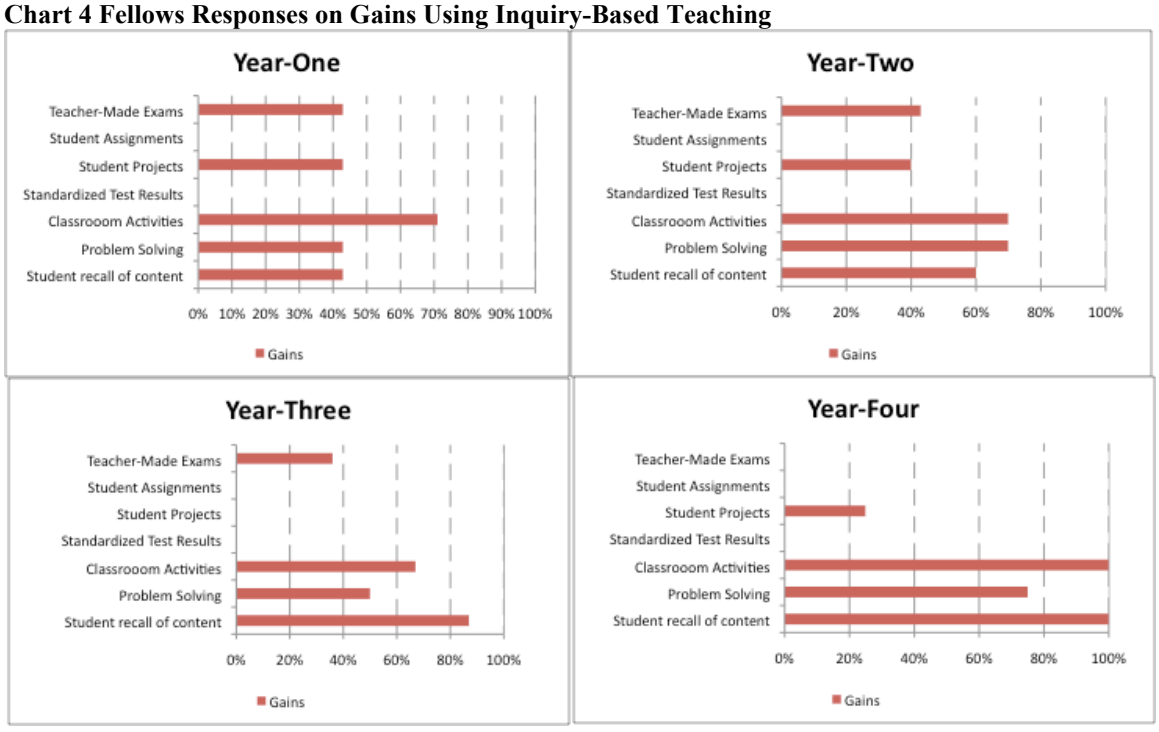
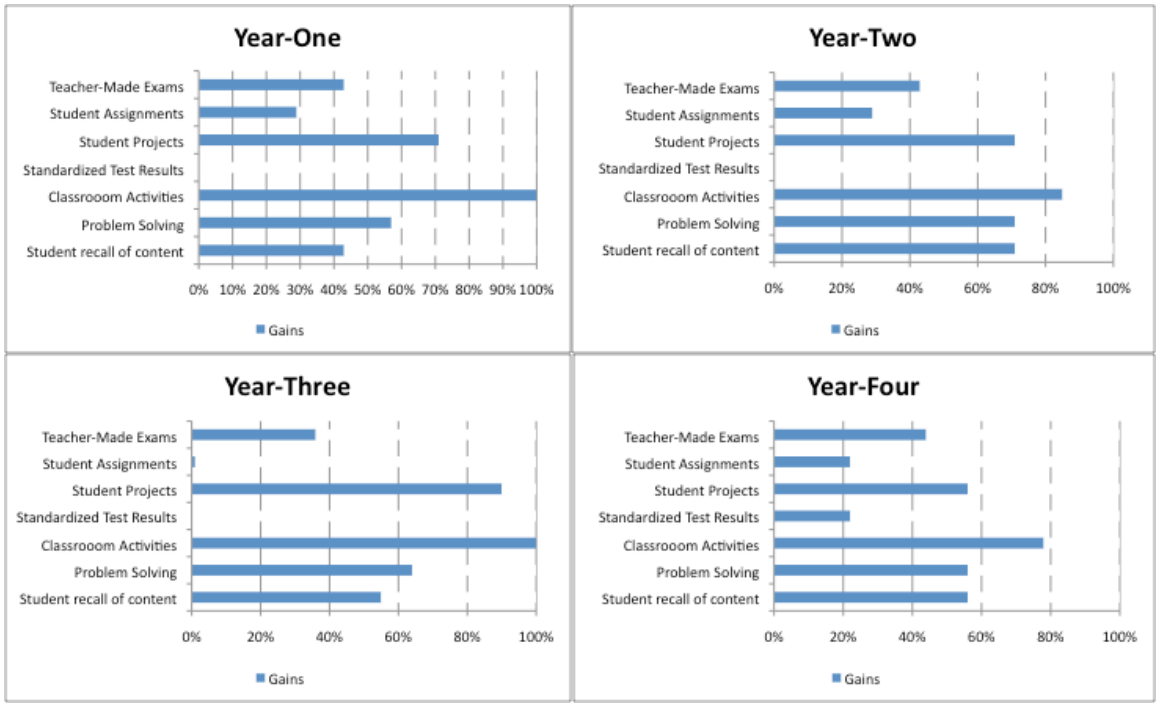


Chart 5 shows the teacher's observations of student achievement for four-years. Teacher's responses indicate students made gains in all but two areas supported by achievement indicators. Teachers did not see gains attributable to inquiry-based teaching regarding Standard Test Results and Student Assignments.

Chart 5 Teachers Responses to Gains from Inquiry-Based Teaching



Teachers' responses to questions regarding inquiry-based learning were positive. Teachers were exposed to inquiry techniques over the four years of the program. They also reported using inquiry techniques now in the classroom. Teachers also seemed to think inquiry learning is effective (Table 16).

Table 16 Teachers Responses To Inquiry-Based

Teacher's response…	Year-One Mean (n=12)	Year-Two Mean (n=11)	Year-Three Mean (n=7)	Year-Four Mean (n=3)	Total Mean (n=33)
I have been exposed to the inquiry-based learning module.	3.1	3.4	4.0	3.0	3.4
The inquiry-based learning module is important for students.	4.2	4.0	4.1	4.3	4.1
I use inquiry-based techniques in the classroom.	3.5	4.0	3.7	4.3	3.8
Inquiry-based learning module is effective in the classroom.	3.8	3.8	4.3	4.5	3.9

Inquiry based techniques are important to the E-MRGE project. Fellows and teachers reported using inquiry-based techniques in the classroom and inquiry techniques seemed

to have a positive impact on the students. The teachers seemed to see more improvement in the student's performance than the fellows saw, and teachers attribute the improvement to inquiry-based techniques.

Evaluation Question 6: Did the Fellow's participation in the preliminary orientation session promote their abilities in being successful contributors to the E-MRGE Project?

Seven fellows attended the orientation session in Year-One before the school term began. At that time, fellows reported having a positive attitude about the E-MRGE project before it began (mean of 4.3). At the time our survey was administered all the fellows reported a slightly less positive (mean of 4.1) attitude toward the project than they had at the start. At the beginning of Year-Two, all 10 fellows attended the "Meet and Greet" Orientation. During Year-Two ISR administered the survey to the fellows in January, at that time the fellows reported they had a positive attitude about E-MRGE at the beginning of the school year and a more positive attitude at the January mid-term than Year-One (Table 17). Year-Three began with higher mean attitude than the first two starts (4.7) but ended much lower (mean of 3.3). The fellows began Year-Four with a positive attitude (mean of 4.5) and finished the school year on a high note (4.3).

Table 17 Fellows Attitude Toward Project

Fellow's response…	Year-One Mean (n=7)	Year-Two Mean (n=10)	Year-Three Mean (n=6)	Year-Four Mean (n=4)	Total Mean (n=27)
Attitude about the project before it began (for them)	4.3	4.6	4.7	4.5	4.5
Current attitude about the project	4.1	4.2	3.3	4.2	4.0

After the Year-One Orientation, fellows offered suggestions for improving the Orientation workshops: 1) Communicate expectations more clearly; 2) Provide more information on what is GK-12; 3) Explain in writing the logistical aspects of the grant such as money allocated, and how to properly fill out paperwork; and 4) Specifically teach and model inquiry techniques – "how do you get kids to ask and improve their own questions."

Table 18 Fellows Attitude Toward Orientation

Fellow's response…	First Year Fellows Mean (n=11)	Second Year Fellows Mean (n=11)
The Orientation was helpful	2.6	2.5

The fellows reported feeling neutral to the "Meet and Greet" Orientation. Table 18 shows the attitude of first year fellows compared to fellows during their second year. The fellow's attitude was lower their second year than it was the first year.

After the Year-Two Orientation, the fellows offered similar suggestions but with a few more specifics. They suggested having: 1) More examples of inquiry-based learning

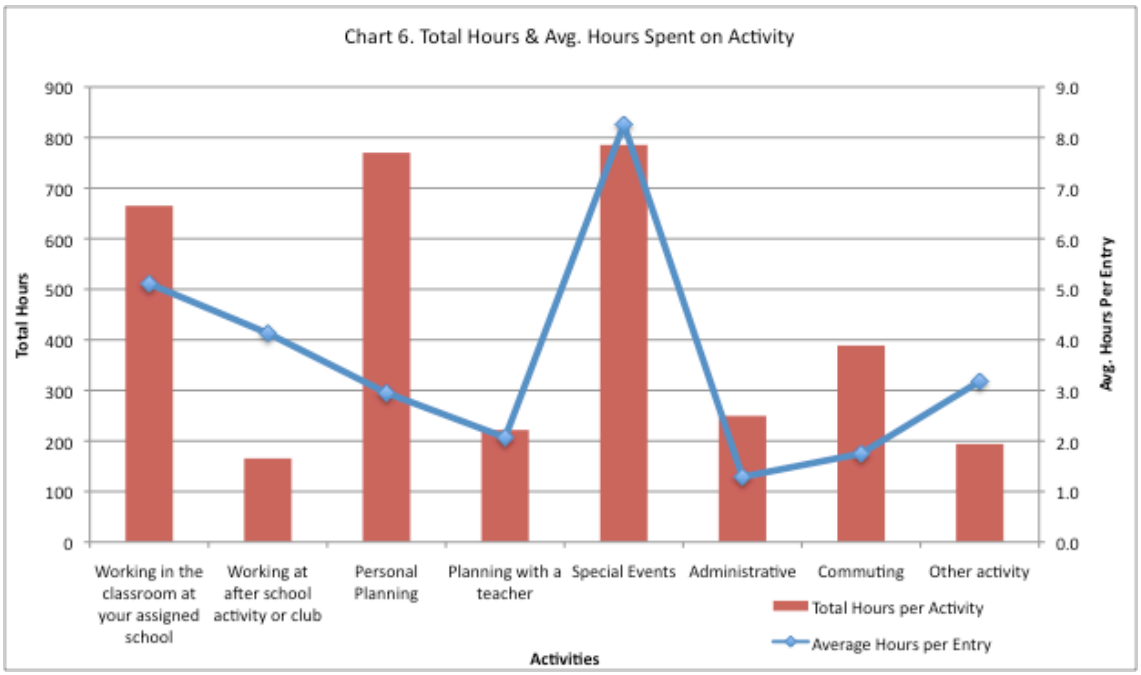
techniques to implement in classroom; 2) Information on dealing with the Institutional Review Board (IRB) process so the results of classroom activities can be published; 3) Specifics about what is expected of the fellows as far as products go; 4) Focus on "a day in the life of" type presentation; 5) More teachers should be present; 5) Explore aspects of the inquiry-based method, i.e., make teachers/specialists available to explain what it is, how it works, and provide example lesson plans.

Year-Three got off to a slow start. It happened that the UNM school year did not begin as early as the middle schools did so the fellows were still preparing to join the program when the schools were already underway. Schedules did not coincide, the teachers and the fellows could not agree on a time to have an orientation session. The meeting at the mid-year was held in January 2009. An orientation and workshop did not take place in the fourth year of the program.

Work Logs

Fellows were asked at the start of Year-Two to submit a record of the time they spent on the project. Each of the fellows submitted a work log. Three fellows submitted the bulk of the entries. Chart 6 diagrams by activity, the total hours and the average hours per entry for all fellows. The activities are: Working in the classroom at your assigned school, Working at after school activity or club, Personal Planning, Planning with a teacher, A special event, Administrative, Commuting, and Other or Miscellaneous.

Chart 6 2008-2009 Fellow's Average And Total Hours Spent On Each E-MRGE Project Activity



The activities averaging the most time per entry were: working in the classroom (5 hours per entry) and special events (8.3 hours per entry). Administrative duties, commuting, and planning with the teacher averaged the least amount of time (approximately 2 hours per entry). The total hours do not reflect the complete picture of the time spent, because

just 30% (3) fellows contributed the greatest amount of work entries. Fellow participation in the work logs decreased the third year and fourth year of the project.

Summary

The first goal of the project was to develop collaborations, improving the teaching and outreach skills of the E-MRGE fellows, and the content knowledge and its application for K-12 teachers. This goal seems to have been achieved. Responses during the four years of the project from teachers, fellows, and students indicate the fellows benefited from the project. Their educational experiences were enhanced and their communication and teaching skills seemed to have improved. The opportunities to teach, present information, and direct experiments seems to have an impact on the fellow's improved communication skills. The fellows reported having a very positive attitude about the program all four years.

The second goal of the project, was to enable graduate teaching fellows in disciplines related to ecohydrogeology to understand better the educational opportunities and practices of public schools. The out-of-classroom activities initiated by the fellows illustrate how the fellows were able to take an idea, i.e., a summer camp, and use the opportunities available in the public schools structure to enhance the student's education. There are not always opportunities and positive practices available in the public schools. The fellows discovered this fact, as they had to deal with inadequate equipment and supplies. However, the fellows seemed to succeed in the program without or with limited special equipment.

The program's third goal related to strengthening existing partnerships and creating new ones among the University of New Mexico and rural school districts. Overall, the E-MRGE program seems to have had a positive influence on the participating teachers. Each year, teachers report they were very confident in their ability to teach facts and vocabulary. Teachers rate the benefits of E-MRGE high for the first three years.

The fourth goal was to provide the context for collaborations among the E-MRGE participants so everyone can better understand and contribute to interdisciplinary scientific study, as well as teaching and learning about ecohydrogeology. Responses from the fellows, teachers, and students indicate the E-MRGE project had a positive impact on the students. Teachers report the inquiry-based teaching technique had a positive impact on students' motivation. Students appear to be motivated, in part, due to the effect of inquiry-based teaching. Students had a more positive attitude toward science, suggesting the fellows and the E-MRGE program had a positive impact on the students.

The fifth goal sought to actively involve K-12 teachers and students in relevant inquiry to investigate interdisciplinary ecohydrogeology questions in the Middle Rio Grande Region using the processes, skills and tools of science, technology, engineering, and mathematics (STEM). Inquiry based techniques were important to the E-MRGE project. The fellows gave the teachers high ratings and the teachers gave themselves high ratings concerning issues related to inquiry-based learning. Fellows and teachers reported using inquiry-based techniques in the classroom and inquiry techniques seem to have a positive

impact on the students. The teachers and fellows witnessed improvement in the student's performance and attributed the improvement to inquiry-based techniques.

The sixth goal of E-MRGE was to familiarize the teachers and students with the literature, media, technology, and local community resources that will increase their STEM knowledge and their ability to access further knowledge. ISR found that students responded well to the E-MRGE program, evidenced by their positive attitude toward the program. ISR also found that students were interested in science and continuing their education. ISR also found that participant teachers also had a positive response to the program. Teachers and students responded positively to the out-of-classroom activities the fellows facilitated during the four-year program.

Recommendations

During the entire program, students rated the fellow's demeanor and classroom technique very high. This was one of the most consistent series of ratings. This seems to be one of the strengths of the E-MRGE program. The lesson learned would be for future GK-12 programs to build on this asset of the program.

Another strength of the program was the fellow's ability to demonstrate "science" and the scientific method to the students. The fellow's graduate level education was an asset to the program. In addition to the fellows teaching students in the classroom, ISR recommends the fellows spend designated time to teach the teacher. This would provide teachers additional and relevant skills that could lead to increasing the interest of some students in science, the scientific method, and STEM careers.

ISR recommends the teachers and fellows set aside a specific amount of time to plan their classroom activities. Planning time would also give the teacher and fellow an opportunity to define their roles in the classroom. During the four years of the E-MRGE program ISR found the more planning the fellows and teachers spent together, the more the classroom activities were enhanced and the student's interest increased.

Chart 2 makes the point that inquiry-based techniques had a positive impact on the student's interest in science. Teachers are immersed in teaching science facts, rules, and vocabulary and they are comfortable teaching these concepts. Over the four years of the E-MRGE program, teachers reported improvements in using inquiry-based techniques. ISR recommends, at some point in the middle-school grades, teachers move on to using more inquiry-based techniques. The students have responded positively to the extra efforts the E-MRGE program has provided to use inquiry-based concepts.

Outdoor activities and summer events, though requiring additional time and energy, were positively accepted and attended by the students. This situation was implied in the initial E-MRGE proposal and was a natural result of the fellow's using their interests and skills to add to the program. ISR recommends future GK-12 programs utilize "out-of-the-box" ideas that have the potential of increasing the impact of the initial program proposal.

Finally, after the first semester of the program ISR suggested two ideas to the E-MRGE PIs, track time and hold routine meetings. These two suggestions were incorporated and ISR feels they added to the fellow's experience. Fellow's had many activities that required teamwork with other fellows in the program and the routine meetings gave the fellows a forum to meet. Tracking time and activities was not a pleasant task but ISR feels the fellows were able to see where their time was spent and the value of spending time more efficiently on certain activities.

Appendix

Appendix 1 Class Room Observation Form

Appendix 2 Observer Scale

Appendix 3 Teacher Survey

Appendix 4 Fellows Survey

Appendix 5 Student Survey

ISR Observer:_____

GK12 Biology

Classroom Observation Form

DRAFT – (revised 09/28/06)

Site (*circle one*): Belen Socorro Albuquerque

Name of School: _____

Name of Class: _____

Activity (*tutoring session, regular class, experiment*): _____

_____

Date: _____ **Begin time**: _____ **End time:** _____

Name of Teacher and Fellow: _____
(*if Fellow is not present write: "Fellow not present"*)

How many students are involved? _____

Grade Level(s) of students involved: _____

Are others present (*i.e. parents***?** *If so, how many?)* : _____

_____

Observer Comments:

OBSERVATION NOTES

What happened during the class session? Who was involved? What questions were asked? Were students paying attention? Did activity leader have control of students? Please be as descriptive as possible. Use quotation marks for direct quotes; describe interactions, recurrent themes, non-verbal communication. Avoid assumptions and vague language. This space is for observational notes only. **Please attach your typed analytical notes to this completed form. At the end of your analytical notes, you should make bullet points of issues, concerns or items that may deserve further attention.**

Field Notes	**Notes to Self (interpretive/analytical)**

OBSERVER SCALE

	Not at all				To a great extent	N/A
1 The Teacher encourages the Students; uses hands-on interactive activities; uses science terminology; and asks probing questions.	1	2	3	4	5	6
2 The Fellow encourages the Students; uses hands-on interactive activities; uses science terminology; and asks probing questions.	1	2	3	4	5	6
3 Students are allowed to discover on their own with Teacher guidance; work in groups	1	2	3	4	5	6
4 Students are allowed to discover on their own with Fellow guidance; work in groups	1	2	3	4	5	6
5 Students appear to be interested; learning scientific method.	1	2	3	4	5	6
6 Teacher and Fellow plan together before class.	1	2	3	4	5	6
7 Fellow demonstrates confidence, expertise, and communication skills.	1	2	3	4	5	6
8 Teacher's instructional content benefits from the Fellow's contribution.	1	2	3	4	5	6

The University of New Mexico

GK-12 Survey for Teachers

The Institute for Social Research at the University of New Mexico has been contracted to conduct an evaluation of the GK-12 Program. The attitudes and opinions of the program participants are an important part of our evaluation. We would like to ask you about your experiences in the GK-12 Program. Your answers to this survey will help us to evaluate the program and make recommendations to secure the future success of the program.

This questionnaire is confidential and will only be seen by the researchers. We are legally bound to preserve the confidentiality of all respondents. Your participation is completely voluntary.

SECTION I – DEMOGRAPHIC DATA

1. Your Name _____
2. School Name _____
3. The grade level(s) you teach _____
4. Counting this year, how many years have you taught at either the elementary or secondary level? *(round to the nearest year and include part-time teaching experience)* _____ years.
5. How many years have you taught science? *(round to the nearest year and include part-time teaching experience)* _____ years.
6. What was the major field of study for your Bachelor's degree? _____
7. What year did you receive your Bachelor's degree? _____
8. What college or university did you graduate from? _____
9. Do you have a Master's degree? _____
10. What was the major field of study for your Master's degree? _____
11. What year did you receive your Master's degree? _____
12. What was the major field of study for your last degree? _____
13. What college or university did you graduate with a Master's degree?_____
14. During the last two years, how many college courses have you taken in science or science education? _____
15. During the past two years, have you taken college courses in any of the following? Check all that apply.

    ___ Methods of teaching science
    ___ Biology / Life Science
    ___ Chemistry
    ___ Physics
    ___ Earth Science

16. During the past five years, have you taken courses or participated in professional development activities in any of the following?

___ Use of computers in the classroom
___ Use of computers for data analysis
___ Use of multimedia for science education
___ Laboratory management or safety
___ Inquiry-based science instruction

17. Please estimate how many hours you spent in professional development workshops or seminars in science or science education during the past year? _____ hours.

18. Do you belong to one or more professional organizations related to science?

___ Yes
___ No

SECTION II – INQUIRY BASED TEACHING METHODS

19. Since becoming involved with the GK-12 program, how frequently have you used inquiry-based activities in your science teaching?

___ Not at all
___ Less than once a week
___ Once a week
___ More than once a week

20. How has inquiry-based teaching affected student achievement in your classroom? (go to Question 22 if "no observable gain" was observed)

___ No observable gain have been noted.
___ Some gains have been observed.
___ Moderate gains have been observed.
___ Large gains have been observed.

21. If gains in student achievement have been observed, which performance indicators have shown improvement? Check all that apply.

___ Performance on teacher-made exams
___ Student assignments, like homework
___ Student projects
___ Standardized tests results
___ Hands-on classroom activities
___ Student problem-solving in the classroom
___ Student recall of content
___ Other (please state) _____

22. Which performance indicator(s) demonstrate your observation of "no observable gain"? Check all that apply.

___ Performance on teacher-made exams
___ Student assignments, like homework
___ Student projects
___ Standardized tests results
___ Hands-on classroom activities
___ Student problem-solving in the classroom
___ Student recall of content
___ Other (please state) _____

23. How has inquiry-based teaching affected student motivation in your classroom?

___ No observable differences have been noted.
___ Students are less receptive/responsive to learning.
___ Students are more receptive/responsive to learning.

SECTION III – PERCEPTION OF INQUIRY AND TEACHING SKILLS

Please indicate <u>how confident</u> you feel about the following aspects of skills and knowledge related to teaching and <u>how important</u> you believe these issues are for the grade level(s) you teach.

My Level of Confidence					Level of Importance			
Not Confident	Slightly Confident	Moderately Confident	Very Confident		Not Important	Slightly Important	Moderately Important	Very Important
1	2	3	4	Teaching facts, rules, and vocabulary	1	2	3	4
1	2	3	4	Use of inquiry-based learning techniques in the school	1	2	3	4
1	2	3	4	Encouraging students to explore methods for solving problems.	1	2	3	4
1	2	3	4	Implementing inquiry-based instruction in the classroom	1	2	3	4
1	2	3	4	Guiding students as they carry out an experiment.	1	2	3	4
1	2	3	4	Developing students' abilities to critique and analyze results.	1	2	3	4
1	2	3	4	Developing student interest in science.	1	2	3	4
1	2	3	4	Knowledge of the state curriculum standards for science.	1	2	3	4
1	2	3	4	Ability to use a variety of instructional techniques in the classroom.	1	2	3	4
1	2	3	4	Incorporating hands-on materials in teaching.	1	2	3	4
1	2	3	4	Motivating students to consider advanced studies in science.	1	2	3	4
Not Confident	Slightly Confident	Moderately Confident	Very Confident		Not Important	Slightly Important	Moderately Important	Very Important
1	2	3	4	Facilitating student learning using a collaborative teaching environment.	1	2	3	4
1	2	3	4	Facilitating students working in small groups.	1	2	3	4
1	2	3	4	Overseeing classroom discipline/classroom management.	1	2	3	4

Please respond to the following statements by circling the number that best indicates your response to the statement.

		Not at all				To a great extent
38	Students in my classes appear to be interested; learning the scientific method.	1	2	3	4	5
39	I guide students to make discoveries and to work in groups.	1	2	3	4	5
40	I encourage students to use hands-on interactive activities, science terminology, and ask probing questions.	1	2	3	4	5
41	I plan with the Fellow before class begins.	1	2	3	4	5
42	The Fellow I work with demonstrates confidence, expertise, and good communication skills.	1	2	3	4	5
43	My instructional content has benefited from the Fellow's contributions.	1	2	3	4	5
44	Collaboration between the Fellow and the Teacher is important.	1	2	3	4	5
45	I am satisfied with my current level of collaboration with the GK-12 Fellow.	1	2	3	4	5
46	Adequate supplies, materials, and equipment in the classroom are important for the GK-12 Program to succeed.	1	2	3	4	5
47	There are adequate supplies, materials, and equipment in my classroom to perform the experiments required by the Standardized Test Program.	1	2	3	4	5
48	The GK-12 Program can succeed without special equipment.	1	2	3	4	5
49	I have adequate computing equipment in my classroom.	1	2	3	4	5
50	I have been exposed to the Inquiry-Based Learning module.	1	2	3	4	5
51	The Inquiry-Based Learning module is important to teach science to students.	1	2	3	4	5
52	I use Inquiry-Based Learning techniques in the classroom.	1	2	3	4	5
53	The Inquiry-Based Learning module is an effective method for teaching science	1	2	3	4	5

	in my classroom.					
54	I have knowledge of the scientific method adequate to meet the needs of my students.	1	2	3	4	5
55	It is important for Teachers to increase their scientific knowledge.	1	2	3	4	5
56	Working with the GK-12 Fellow has improved my knowledge of science.	1	2	3	4	5
57	Working with the GK-12 Fellow has improved my ability to teach science.	1	2	3	4	5
58	I was involved in the planning and design of the GK-12 Program in my school.	1	2	3	4	5
59	I had a positive attitude toward the GK-12 Program before it began.	1	2	3	4	5
60	My current attitude toward the GK-12 Program is best described as positive.	1	2	3	4	5
61	I was given the resources, training, and direction necessary to perform my role in the GK-12 Program.	1	2	3	4	5
		Not at all				To a great extent
62	The Fellow who I am most familiar with plans activities for the classroom.	1	2	3	4	5
63	The Fellow's ability to communicate to the students has improved since the start of the GK-12 Program.	1	2	3	4	5
64	The GK-12 Orientation was beneficial for understanding my role and responsibilities in the Program.	1	2	3	4	5
65	The Orientation handouts and materials were helpful to the job I perform in the classroom.	1	2	3	4	5
66	The training during the orientation was adequate for working with students in my school.	1	2	3	4	5

SECTION III – COLLABORATION AND PROFESSIONAL DEVELOPMENT

67. Do you have a Fellow assigned to work with you?

___ Yes
___ No

68. How often do you meet or communicate with your Fellow?

___ Almost daily
___ Once a week
___ Several times a month
___ Once a month
___ Less than once a month

69. What is the **primary** focus of your meetings or communications with the Fellow? **(choose one)**

___ Study of academic content of the subject I teach
___ Understanding New Mexico standards and helping students master the NM standards.
___ Prepare lesson plans for the next day or week.
___ Collaboration for improving instruction.
___ Strategies for creating and maintaining safety and order in the classroom.
___ Other; specify _____

70. What **else** do these meetings or communications focus on? **(Choose all that apply.)**

___ Study of academic content of the subject I teach
___ Understanding New Mexico standards and helping students master the NM standards.
___ Prepare lesson plans for the next day or week.
___ Collaboration for improving instruction.
___ Strategies for creating and maintaining safety and order in the classroom.
___ Other; specify _____

Finally, please circle the response that best describes your answer to the statement.

71. Participating in the GK-12 Program broadened and deepened my educational/professional experience this year.

Strongly Disagree	Disagree	Agree	Strongly Agree

72. The GK-12 Fellow has contributed to my better understanding of scientific study.

Strongly Disagree	Disagree	Agree	Strongly Agree

73. The University of New Mexico through the GK-12 Program has provided professional development resources to me to enhance my science instruction in the classroom.

Strongly Disagree	Disagree	Agree	Strongly Agree

74. What do you like most about the GK-12 Program? Explain your answer in the box.

This completes the survey. Thank you for assisting us in this important research. Your time and effort are appreciated.

GK-12 Survey for Fellows

The University of New Mexico

The Institute for Social Research at the University of New Mexico has been contracted to conduct an evaluation of the GK-12 Program. The attitudes and opinions of the program participants are an important part of our evaluation. We would like to ask you about your experiences in the GK-12 Project. Your answers to this survey will help us to evaluate the program and make recommendations to secure the future success of the program.

This questionnaire is confidential and will only be seen by the researchers. We are legally bound to preserve the confidentiality of all respondents. Your participation is completely voluntary.

SECTION I – DEMOGRAPHIC DATA

1. Your Name _____

2. Name of the School(s) where you teach _____

3. The grade level(s) you teach _____

4. Before the GK-12 program, did you have any teaching experience?

   ___ Yes
   ___ No

5. Have you taught at either the elementary or secondary level?

   ___ Yes
   ___ No

6. If you answered yes to Question 5, how many years have you taught? *(round to the nearest year and include part-time teaching experience)* _____ years.

7. Please check the highest level of formal education you have completed.

   ___ Bachelor's degree
   ___ Bachelor's degree + 15 hours or more
   ___ Education specialist
   ___ Master's degree
   ___ Master's degree + 15 hours or more
   ___ Doctorate

8. What was the major field of study for your last degree? _____

9. During the past two years, have you taken courses or participated in professional development activities in any of the following?

   ___ Use of computers in the classroom
   ___ Use of computers for data analysis
   ___ Use of multimedia for science education
   ___ Laboratory management or safety
   ___ Inquiry-based science instruction

10. Do you belong to one or more professional organizations related to science?

___ Yes
___ No

SECTION II – INQUIRY BASED TEACHING METHODS

11. Since becoming involved with the GK-12 program, how frequently have you used inquiry-based activities in your classroom teaching?

___ Not at all
___ Less than once a week
___ Once a week
___ More than once a week

12. How has inquiry-based teaching affected student achievement in your classroom? (go to Question 14 if "no observable gain" was observed)

___ No observable gain have been noted.
___ Some gains have been observed.
___ Moderate gains have been observed.
___ Large gains have been observed.

13. If gains in student achievement have been observed, which performance indicators have shown improvement? Check all that apply.

___ Performance on teacher-made exams
___ Student assignments, like homework
___ Student projects
___ Standardized tests results
___ Hands-on classroom activities
___ Student problem-solving in the classroom
___ Student recall of content
___ Other (please state) _____

14. Which performance indicator(s) demonstrate your observation of "no observable gain"? Check all that apply.

___ Performance on teacher-made exams
___ Student assignments, like homework
___ Student projects
___ Standardized tests results
___ Hands-on classroom activities
___ Student problem-solving in the classroom
___ Student recall of content
___ Other (please state) _____

15. How has inquiry-based teaching affected student motivation in your classroom?

___ No observable differences have been noted.
___ Students are less receptive/responsive to learning.
___ Students are more receptive/responsive to learning.

SECTION III – PERCEPTION OF INQUIRY AND TEACHING SKILLS

Please indicate <u>how confident</u> you feel about the following aspects of skills and knowledge related to teaching and <u>how important</u> you believe these issues are for the grade level(s) you teach.

My Level of Confidence					Level of Importance			
Not Confident	Slightly Confident	Moderately Confident	Very Confident		Not Important	Slightly Important	Moderately Important	Very Important
1	2	3	4	Teaching facts, rules, and vocabulary	1	2	3	4
1	2	3	4	Use of inquiry-based learning techniques in the school	1	2	3	4
1	2	3	4	Encouraging students to explore methods for solving problems.	1	2	3	4
1	2	3	4	Implementing inquiry-based instruction in the classroom	1	2	3	4
1	2	3	4	Guiding students as they carry out an experiment.	1	2	3	4
1	2	3	4	Developing students' abilities to critique and analyze results.	1	2	3	4
1	2	3	4	Developing student interest in science.	1	2	3	4
1	2	3	4	Knowledge of the state curriculum standards for science.	1	2	3	4
1	2	3	4	Ability to use a variety of instructional techniques in the classroom.	1	2	3	4
1	2	3	4	Incorporating hands-on materials in teaching.	1	2	3	4
1	2	3	4	Motivating students to consider advanced studies in science.	1	2	3	4
1	2	3	4	Facilitating student learning using a collaborative teaching environment.	1	2	3	4
1	2	3	4	Facilitating students working in small groups.	1	2	3	4
1	2	3	4	Overseeing classroom discipline/classroom management.	1	2	3	4

Please respond to the following statements by circling the number that best indicates your response to the statement.

		Not at all				To a great extent
30	Students in my classes appear to be interested; learning the scientific method.	1	2	3	4	5
31	I guide students to make discoveries and to work in groups.	1	2	3	4	5
32	I encourage students to use hands-on interactive activities, science terminology, and ask probing questions.	1	2	3	4	5
33	I plan with the Teacher before class begins.	1	2	3	4	5
34	The Teacher(s) I work with demonstrates confidence, expertise, and good communication skills.	1	2	3	4	5
35	My instructional content has benefited from the Teacher's contributions.	1	2	3	4	5
36	Collaboration between the Fellow and the Teacher is important.	1	2	3	4	5
37	I am satisfied with my current level of collaboration with the GK-12 Teacher(s).	1	2	3	4	5
38	Adequate supplies, materials, and equipment in the classroom are important for the GK-12 Program to succeed.	1	2	3	4	5
39	There are adequate supplies, materials, and equipment in my classroom(s) to perform the experiments required by the Standardized Test Program.	1	2	3	4	5
40	The GK-12 Program can succeed without special equipment.	1	2	3	4	5
41	I have adequate computing equipment in my classroom(s).	1	2	3	4	5
42	I have been exposed to the Inquiry-Based Learning module.	1	2	3	4	5
43	The Inquiry-Based Learning module is important to teach science to students.	1	2	3	4	5
44	I use Inquiry-Based Learning techniques in the classroom(s).	1	2	3	4	5
45	The Inquiry-Based Learning module is an effective method for teaching science in my classroom(s).	1	2	3	4	5

46	I have knowledge of the scientific method adequate to meet the needs of the students.	1	2	3	4	5
47	It is important for Teachers to increase their scientific knowledge.	1	2	3	4	5
48	Working with the GK-12 Teacher has improved my knowledge of public education.	1	2	3	4	5
49	Working with the GK-12 Teacher(s) has improved my ability to teach science.	1	2	3	4	5
50	I had a positive attitude toward the Program before it began.	1	2	3	4	5
51	My current attitude toward the GK-12 Program is best described as positive.	1	2	3	4	5
52	I was given the resources, training, and direction necessary to perform my role in the GK-12 program.	1	2	3	4	5
53	The Teacher who I am most familiar with plans activities for the classroom.	1	2	3	4	5
54	The Teacher's scientific study has improved since the start of the GK-12 Program.	1	2	3	4	5

SECTION III – COLLABORATION AND PROFESSIONAL DEVELOPMENT

55. How many Teachers are you assigned to work with during this semester?____

56. Typically, how often do you meet or communicate with a Teacher?

___ Almost daily
___ Once a week
___ Several times a month
___ Once a month
___ Less than once a month

57. What is the **primary** focus of your meetings or communications with the Teacher? **(choose one)**

___ Study of academic content of the subject I present
___ Understanding New Mexico standards and helping students master the NM standards.
___ Prepare lesson plans for the next day or week.
___ Collaboration for improving instruction.
___ Strategies for creating and maintaining safety and order in the classroom.
___ Other; specify _____

58. What **else** do these meetings or communications focus on? **(Choose all that apply.)**

___ Study of academic content of the subject I teach

___ Understanding New Mexico standards and helping students master the NM standards.
___ Prepare lesson plans for the next day or week.
___ Collaboration for improving instruction.
___ Strategies for creating and maintaining safety and order in the classroom.
___ Other; specify _____

59. I attended a GK-12 Orientation at the beginning of my assignment.

___ Yes
___ No

60. The GK-12 Orientation was helpful.

Strongly Disagree	Disagree	Agree	Strongly Agree

61. What would you do to improve the GK-12 Orientation?

_____

_____

Finally, please circle the response that best describes your answer to the statement.

62. Participating in the GK-12 program broadened and deepened my educational/professional experience this year.

Strongly Disagree	Disagree	Agree	Strongly Agree

63. My Teacher(s) has contributed to my better understanding of communication and presenting scientific research.

Strongly Disagree	Disagree	Agree	Strongly Agree

64. Presenting my research and understanding of science to students and teachers has helped me clarify my understanding of my research.

Strongly Disagree	Disagree	Agree	Strongly Agree

This completes the survey. Thank you for assisting us in this important research. Your time and effort are appreciated.

ID # : _____

GK-12 Student Survey

We would like your opinion about science! Now and the next two years, Biology graduate students from the University of New Mexico will be working with science teachers in your school to provide a better understanding of the local environment. We want your opinion regarding these activities.

Teachers, parents, and the other students will **NOT** see your survey answers. Completing the survey has **NO** effect on your course grade. Thank you for giving us your opinion.

Today's Date: ___/___/___

School: _____

Teacher: _____

Section I: Student Attitudes

(Circle the answer that best describes what you think)

I think that …	Strongly agree 1	Agree 2	Not Sure 3	Disagree 4	Strongly Disagree 5
1. Science is very interesting	**1**	**2**	**3**	**4**	**5**
2. It is important for me to know about science in my daily life	**1**	**2**	**3**	**4**	**5**
3. Boys and girls can be equally good at science	**1**	**2**	**3**	**4**	**5**
4. Science is useful in solving everyday problems	**1**	**2**	**3**	**4**	**5**
5. I am good at science	**1**	**2**	**3**	**4**	**5**

Section IV: Student Confidence

(Circle the answer that best describes how confident you feel doing the following)

I am able to…	Very Confident 1	Somewhat Confident 2	Confident 3	A little Confident 4	Not Confident 5
1. Use the scientific method to solve problems.	**1**	**2**	**3**	**4**	**5**
2. Read and understand tables and graphs	**1**	**2**	**3**	**4**	**5**
3. Talk about the properties of planets and moons.	**1**	**2**	**3**	**4**	**5**
4. Identify the properties of elements from the periodic table.	**1**	**2**	**3**	**4**	**5**
5. Observe the properties of bacteria and the changes that can occur.	**1**	**2**	**3**	**4**	**5**
6. Observe and record the properties of living things (like worms).	**1**	**2**	**3**	**4**	**5**

Section V: Demographics

Your grade level (*Check one*): ☐ 6th ☐ 7th ☐ 8th

What year were you born: _____

What is your gender (*Check one)*: ☐ Male ☐ Female

My ethnicity is (*Check one*):

- ☐ Asian or Asian American, including Chinese, Japanese, and others
- ☐ Black or African American
- ☐ Hispanic or Latino, including Mexican American, Spanish, and others
- ☐ White, Caucasian, Anglo, European American; not Hispanic
- ☐ American Indian/ Native American
- ☐ Other (*write in):* _____

What is your average grade in school for <u>all classes</u> so far this year? (*Check one*)

☐ A ☐ B ☐ C ☐ D ☐ F

Thank You Very Much for taking the time to complete this survey!!

Section II: Student Interests

(Circle the answer that best describes how interested you are in the following)

I am interested in…	Strongly agree 1	Agree 2	Not Sure 3	Disagree 4	Strongly Disagree 5
1. Discussing science with friends or family	1	2	3	4	5
2.Reading articles about science in newspapers, magazines, or on the Internet.	1	2	3	4	5
3. Taking additional science courses beyond the required ones.	1	2	3	4	5
4. Going to college	1	2	3	4	5
5. Majoring in a science-related field in college	1	2	3	4	5
6. Joining a science club or organization	1	2	3	4	5

7. What do you **like** about this class? (*Circle all that apply)*

a. Exciting projects
b. Easy assignments
c. Interesting labs/activities
d. Having the fellow in the classroom
e. Little/no homework
f. Teacher's enthusiasm
Other *(Specify):*_____

8. What do you **not like** about this class? *(Circle all that apply)*

a. Boring Material
b. Difficult class assignments
c. Confusing/unclear instructions
d. Simple Class assignments
e. Having the fellow in the classroom
f. Too much homework
g. Teacher's lack of assignments
h. Labs/activities are uninteresting
Other *(Specify):*_____

Section III: Questions about the fellows

(Circle the answer that best describes the UNM Graduate student that has been in your classroom)

The fellow…	Strongly agree 1	Agree 2	Not Sure 3	Disagree 4	Strongly Disagree 5
1. Speaks clearly and can be easily understood.	1	2	3	4	5
2. Challenges me to think about the subject	1	2	3	4	5
3. Makes class interesting	1	2	3	4	5
4. Asks questions that help me understand the topic	1	2	3	4	5
5. Gives clear directions about assignments	1	2	3	4	5
6. Treats me with courtesy and respect	1	2	3	4	5
7. Is patient when working with me	1	2	3	4	5
8. Encourages me to participate in class discussion	1	2	3	4	5
11. Helps me solve problems and do my work.	1	2	3	4	5
12. Seems to like working with me.	1	2	3	4	5
13. Works well with my teacher.	1	2	3	4	5
14. Is friends with my teacher.	1	2	3	4	5