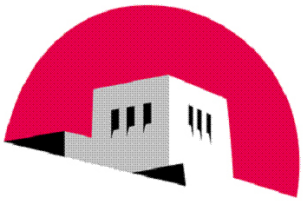
PROGRESS REPORT



The University of New Mexico

GK-12 E-MRGE Project
2006-2007 School Year

January 2008

Dan Cathey, MPA, and 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

Tables

Figures

Charts

Abbreviations

BEMP	Bosque Ecosystem Monitoring Program
E-MRGE	Ecohydrogeology in the Middle Rio Grande Environment
GK-12	NSF Graduate Teaching fellows in K-12
IGERT	Integrative Graduate Education and Research Training
IRB	Institutional Research Board
ISR	Institute for Social Research, University of New Mexico
K-12	Kindergarten through 12th grade
LTER	Long-term Ecological Research Program
NSF	National Science Foundation
PI	Principle Investigator
SNWR	Sevilleta National Wildlife Refuge
STEM	Science, Technology, Engineering, and Mathematics
UNM	University of New Mexico

Preface

ISR has been involved in the E-MRGE project since it began. This Progress Report brings the reader up to the activities of the project during the 2006-2007 school year (May 2007). At the time of printing, the project has completed one year and the Fall Semester of the second year.

Overview of the Ecohydrogeology in the Middle Rio Grande Environment 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, they received funding from NSF for the project.

The overarching vision of the E-MGRE stakeholders, as described in their NSF grant application, is to build links and collaboration between UNM and teachers in two rural communities in New Mexico. By building such connections, they hope 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 will work with middle school teachers from two schools in 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 are also to develop related inquiry-based schoolyard LTER projects providing hands-on science experiences for middle school students. These projects will help teachers meet New Mexico science standards. Teachers also have an opportunity to receive university credit through summer courses offered by UNM's Summer Teachers Institute. E-MRGE stakeholders anticipate the fellows will acquire enhanced teaching skills and teachers participating in the program will gain greater scientific knowledge and a supply of inquiry-based curriculum activities.

Needs Addressed by the Project

UNM began the E-MRGE project in two middle schools in two rural communities in New Mexico. The project stakeholders selected these schools and communities based on location, interest, and need. They explained in the E-MRGE grant proposal that these schools are a distance from Albuquerque so they have less exposure and interactions with career scientists. Additionally, each school district is in proximity - within 19 miles - of the SNWR. The need for a program in these schools was also justified because of their educational standards. In 2004-2005, Socorro had 642 middle school students and Belen had 1,546. Approximately, 64 to 68 percent of the students in these schools are Hispanic. Additionally, in Socorro, 33% of the students are living in poverty and 21% of Belen students live in poverty. Both schools have not met state educational standards and are on disciplinary status.

GK-12 Goals

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.
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.

Project Activities

During the first year of the project, E-MRGE hired seven fellows. The stakeholders announced the fellowships in the Biology, Earth and Planetary Sciences, Chemistry, and Civil Engineering Departments. Applicants must have already started their graduate program at UNM. Four fellows choose to work at Belen Middle School and three at the Sarracino Middle School in Socorro. In the project's second year, two more fellows are slated to be hired for a total of nine. The project stakeholders recruited teachers using in-school visits and enlisting the help of the school's "Points-of-Contact." E-MRGE fellows worked with their assigned teachers to modify existing instructional materials, improve the level and quality of inquiry-based experiences, and develop new learning modules. Fellows were to learn the teachers' objectives for STEM and at the same time address state and local standards in their classes.

Table 1 School year facts and activities

School Year 2006-2007 Facts & Activities

- Seven UNM graduate students were employed as fellows. Four (4) fellows were assigned to Belen Middle School, and three (3) fellows were assigned to work at Sarracino Middle School in Socorro, New Mexico.
- Seven teachers participated in the E-MRGE Project.
- Fellows were typically assigned to work at a specific school and most were assigned to one teacher.
- The E-MRGE Project dealt with students in grades 6 through 8.
- PI's conducted a training/orientation workshop for the fellows and teachers, before the beginning of the 2006 Fall semester.
- E-MRGE Fellows had approximately 21,000 contacts with students during the 2006-2007 school year.
- During the 2006-2007 school year, ISR staff observed a total of 64 classroom sessions, 33 sessions at Belen Middle School and 31 sessions at Sarracino Middle School.

When applicable, fellows also worked with teachers in science-related activities occurring outside of the traditional school day, which improved communication about science in the broader school community. Such activities focused on biology, hydrology, or geology.

The fellows receive contracts for 12-month periods with salaries large enough to attract high-quality candidates in competition for traditional graduate Research Assistant, Teaching Assistant, or other fellowships. The GK-12 program should enrich the fellow's communication skills and knowledge of pedagogy but should not result in a longer time to finish their degrees compared to other students.

Fellows, teachers, and stakeholders participated in a three-day training and orientation workshop before the beginning of the Fall semester. The project's Principal Investigators (PIs) organized and led the workshop. A goal of the training was to give fellows the tools to work effectively in the schools. Time was allocated to deepen the fellows understanding of the teaching and learning process, as well as address other needs identified by the fellows and the teachers. Teachers were introduced to the SNWR, given tours of the facility, and were briefed on the GK-12 program and goals of the E-MRGE project. The workshop provided an opportunity for the fellows to strengthen their network by discussing the project, sharing resources they located or plan to develop. Fellows and teachers shared how they expect to make connections between existing curricula and the goals of E-MRGE. The project proposal anticipates yearly workshops in the Spring of each year given at UNM, where instruction focuses on the scientific study of the Earth, its geology, hydrology, and ecology.

An important proposed outcome of the project is a series of new learning modules for students, created in the process of implementing the project. The PIs envisioned the project as a novel model for creating modern learning modules developed jointly by the teachers, the fellows, and their faculty mentors specializing in different applications of geology, hydrology, and ecology. These additional materials would focus on specific approaches teachers could use to introduce scientific inquiry-based learning in their classrooms, with hands-on investigation, and student-directed learning, all in the context of a classroom activity. The modules were to include simple but innovative experiments that integrate recent advances in concepts in physical science, chemistry, or biology, and encourage critical thinking about the impacts of science on the environment and the implications of advanced scientific research on human lives. During Year 1, fellows and faculty mentors planned to develop learning modules in collaboration with teachers. In Year 2, the stakeholders anticipate increasing the number of E-MRGE fellows from seven to nine.

Evaluation Questions

Evaluation questions measure 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 initial 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?

ISR Evaluation Methodology

We designed an evaluation drawing on NSF evaluation methods. ISR drew on multiple information sources and perspectives to evaluate the project. ISR staff implemented a quantitative and qualitative data collection method and developed an observation instrument, a scaled questionnaire, methods for observing, protocols for conducting observations in the classroom, and survey instruments. We made an effort to blend research methods because a project as dynamic as E-MRGE would be best served with two forms of measureable data, i.e., quantitative and qualitative.

Table 2 Data collection methods

Data Collection Methods and Quantity Matrix	
Method	**Quantity**
Surveys:	7 fellows, 7 teachers, and 49 students
Observations:	64 observations during the 2006-2007school year
Official UNM Registrar Data:	7 fellows described

Surveys

In February 2007, we distributed the surveys 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 they have to issues related to the evaluation questions.

Non-Participant and Participant Observation

Observations by staff were framed by guidelines put forth by standards of ethnographic fieldwork in which interpersonal relationships and interactions are 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 the event and activity 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.

Official School Data

During February 2007, ISR staff distributed consent forms to teachers and fellows. These consent release forms were used to acquire the fellow's official UNM records, i.e., grade point averages, majors, etc. Teacher information included years of employment, education level, and college major.

Findings 2006 Fall Semester

Quantitative

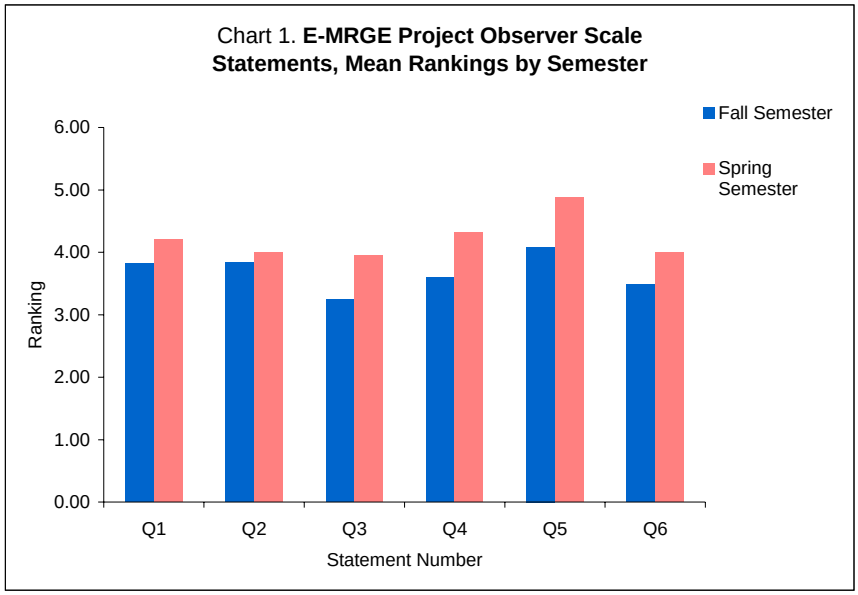
While observing in the classrooms, ISR observers completed an "Observer Scale." The Scale contained six statements related to the goals of the Project. ISR observers viewed the class sessions, focusing on six behaviors that exemplified the six statements on the Scale (see Table 3). They ranked what they observed on a scale of 1 to 6, with "1" suggesting the behavior was not observed and "5" indicating the behavior was displayed to a "great extent" during the class session. A ranking of "6" means the ranking was not applicable.

Table 3 Observer scale statements

Observer Scale Statements
Q1. The Teacher encourages the Students; uses hands-on interactive activities; uses science terminology; and asks probing questions.
Q2. Students are allowed to discover on their own with Teacher guidance; work in groups.
Q3. Students appear to be interested; learning scientific method.
Q4. Teacher and Fellow plan together before class.
Q5. Fellow demonstrates confidence, expertise, and communication skills.
Q6. Teacher's instructional content benefits from the Fellow's contribution.

Using the Observer Scale data, ISR reported in a preliminary *Report in Brief* completed in February 2007, that during the 2006 Fall semester, the fellows appeared to be confident and improved their communication skills in the classroom. Teachers and fellows use inquiry-based interactive teaching techniques and allow the student to discover science. These are positive actions despite the limited time the teachers and fellows had for planning together. Chart 1 describes the ISR observer by semester data for each of the statements on the Observer Scale for the entire 2006-2007 school year.

Chart 1 Observer scale statements, mean rankings by semester



During the Fall Semester the fellow's abilities in the classroom (Q5) was the highest rated observable behavior (mean score of 4.1) scored by ISR observers. Students appeared to be interested in the class activities (Q3, mean of 3.2). Teachers received a mean score of 3.8 for encouraging the students and incorporating inquiry-based learning techniques in the class activities (Q1). Teachers seemed to benefit from the fellow's contribution (Q6, mean of 3.5). Teachers received higher ratings (3.8) for allowing students to discover science and work in groups (Q2). Observers found it difficult to determine whether teachers and fellows are planning together before each class session. Observers asked teachers and fellows for information related to this question. Observers felt the lack of participation during activities by the teacher or the fellow during classroom activities was an indication of the level of planning (Q4, mean of 3.6).

ISR observer ratings were higher in all categories for observations taken during the Spring 2007 Semester. Observers saw students discovering science on their own as teachers guided learning (Q2, mean of 4.0). Additionally, planning seemed to have improved, as observers saw more interaction between teachers and fellows (Q4, mean of 4.3) and teacher's instructional content seemed to have benefited due to the fellow's contributions (Q6, mean of 4.0). Observers rated the fellow's abilities in the classroom very high (Q5, mean of 4.9).

Qualitative

During observation sessions, ISR observers recorded comments and summarized their observations. These ISR observer's comments related to the four (4) topic areas on the Observer Scale. Qualitative information was difficult to analyze and put into context due to changes in the observer staffing. During the 2007 Spring Semester, qualitative data collection was minimized, as it was decided survey data was more crucial to the evaluation and required time for the ISR staff to process. Below is a sample of comments from the observer's analytical notes during the 2006 Fall Semester.

Sample of some of the more positive comments:

"The Fellow introduced scientific techniques and process to the Teacher and Students by: finding the bacteria experiment protocol on the Internet, organizing the experiment, buying the supplies, and leading the experiment."

"The Teacher wants to repeat this experiment next year if it is successful. The Students appear to be very interested in the experiment."

"It is obvious that the Teacher and the Fellow work closely together throughout every aspect of the class."

". . . the students seemed excited about their projects."

"The Teacher and Fellow repeat a previously successful activity."

"Fellow did a nice job of tying the lab activity to his presentation. The Fellow rarely supplies answers too quickly, giving the Students a chance to think."

"The Students were very interested in the lab and the Fellow's presentation."

"The Teacher consistently follows up questions to students with more questions... She seems to have mastered the inquiry-based style of teaching."

Sample of less positive comments:

"The Teacher lectures from a book. As the Fellow joins in the activity the Students become more engaged in the discussion."

"Fellow not in attendance, so the Teacher lectured from the book."

"The Teacher and Fellow obviously have worked separately the entire semester."

The ISR preliminary report noted, fellows and teachers attempted to teach using inquiry-based learning techniques; students were interested in lab activities; planning seemed very beneficial to the success of the labs; and student participation in class decreased when the fellows were absent.

Fall 2006 Mid-Year Suggested Changes

ISR made several suggestions to the E-MRGE stakeholders in the February 2007 *Report in Brief*. Obviously, the more information that exists about the E-MRGE project the more we can learn about how the project works and what could be improved for the benefit of other GK-12 projects. Our observations and informal interviews were a beginning but we felt the surveys and background information on the fellows would add to our ability to measure the project. Findings from the quantitative and qualitative data suggested several time management changes would improve the program. We suggested two immediate changes to the project in our *Report in Brief*.

1. Work logs – The fellows should be required to give the PI's and ISR a weekly work log of their activities. The work log should include the frequency and amount of

time spent on six specific activities: working in the classroom; personal planning; planning with a teacher; special events; administrative tasks, and miscellaneous tasks. This information will give the PI's a management tool and provide ISR staff with data to compare to the surveys and observation scales.

2. Bi-weekly Seminar – The program would benefit from a routine opportunity for the fellows to meet to compare notes and reflect on their experiences. A meeting of this nature would need to be organized by the PI's or similar persons. ISR noted, the UNM/APS GK-12 Optic and Photonics Education Program has benefited by having an Albuquerque Public School employee lead a bi-weekly seminar. The APS employee is an experienced middle-school teacher and principal and is very aware of the challenges of teaching in the public school system.

Description of E-MRGE Fellows and Teachers

We collected information to describe the E-MRGE fellows from information we found in the UNM Registrar's files, resumes, and direct questions asked of the fellows. Table 4 characterizes the 2006-2007 Fellows. Additionally, teachers were asked to describe themselves in the survey. See Table 6 for their responses.

Table 4 Description of 2006-2007 fellows

Description of 2006-2007 Fellows	
Characteristic	**Summary**
Demographics	• 6 are white, and one is Hispanic. • 5 Males and 2 Females. • 4 are single - 3 are married – 4 have children. • Average age is 32.4. • All are working their first year on the project.
Education	• Fellows have undergraduate degrees in biology (4), geology (2), and 1 in marketing. • All are in a Ph.D. program at UNM. • At least 4 received honors as undergraduates. • 1 received an undergraduate degree from a New Mexico colleges – 6 graduated from colleges outside NM. • Research topics, e.g., water vapor transport with stable Isotopes, reptile life cycle issues, groundwater biogeochemistry, Tectonics in California.
Employment & Income	• All fellows have a previous employment history. • All have experience as teaching assistants, teaching courses, or as research assistants. • *All aspire generally to jobs in teaching or research. • 6 report GK-12 Scholarship is a primary source of income.
Activities	• 5 participate in extracurricular activities • All belong to professional organizations or affiliations

All the fellows are in the biology or planetary sciences graduate program and aspire to jobs in teaching or research. Several (4) received honors as undergraduates. Most of the fellows (5) are male, and one is Hispanic. ISR observers noted that in staff meetings the

fellows had numerous innovative ideas for instructing the teachers and students about science.

Teachers were asked in the survey to describe themselves. Their responses are summarized in Table 5. ISR attempted to increase the number of teacher responses by awarding at random, two $50 gift certificates to teachers who completed the survey. Two teachers responding to the survey had taught for more than 10 years. Three majored in a science related field in college; and three have graduate degrees in education related fields.

Table 5 Description of 2006-2007 teachers

Description of 2006-2007 E-MRGE Project Teachers: Responses to a Survey	
Characteristic	**Summary**
Schools & Experience	• All teachers responded to the survey. • 2 have taught school more than 10 years – 1 year is the minimum and 13 years the maximum years taught. • 5 have taught science 4 years or less.
Education	• 3 majored in a science related field in college. • 4 majored in an education or fine arts related field in college. • 5 graduated from New Mexico colleges. • 3 have Masters Degrees related to the field of education.

Student Survey

During the first week of May 2007, approximately 140 students were given parental consent forms to return to their teachers. We attempted to increase the number of student responses by awarding at random, two $40 gift certificates to students who completed the survey. Of the 140 students, 21 students from Belen Middle School and 28 from Sarracino Middle School in Socorro completed the survey, a 35% return. The majority (61%, 30) of the students were in the 7th grade, 12 were in the 6th grade, and 7 were in the 8th grade. The number of boys and girls was evenly split (23 girls and 25 boys). Seventy-one percent (35) were Hispanic and 22% were Anglo. A large majority of the students (79%) taking the survey reported making good grades (A or B).

Report Results

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

The fellows reported they benefited from participating in the GK-12 Project. The ISR Survey for Fellows included four questions that addressed the first evaluation question. Fellows were asked if the project broadened and deepened their educational/professional experience; did the teacher's contribution benefit the fellow's instructional content; did the assigned teacher contribute to the fellow's ability to communicate; and did the GK-12 project help the fellows clarify their research (Table 6). Fellows agreed the project was beneficial to their education and agreed the teacher helped the content of their

instruction. They expressed mixed opinions about the project benefiting their communication skills; three (3) did not agree with this statement. Regarding their own research, the fellows did not agree the project had helped them clarify their work.

Table 6 Fellows benefit from project

	The GK-12 Program broadened/deepened experience this year	My instructional content has benefited from Teacher's contribution	Teachers contributed to better understanding of communication and presenting	GK-12 Program has helped clarify understanding of research
N	7	7	7	7
Mean	3.6	3.5	2.9	2.7
Minimum	3	1	2	1
Maximum	4	5	4	4

Chart 2 expresses the teacher survey responses regarding the quality of the GK-12 fellows on the project. All teachers agreed the fellows were capable and qualified. Four teachers gave the fellows the highest rating ("5") for this topic.

Chart 2 Teachers summation of fellows abilities

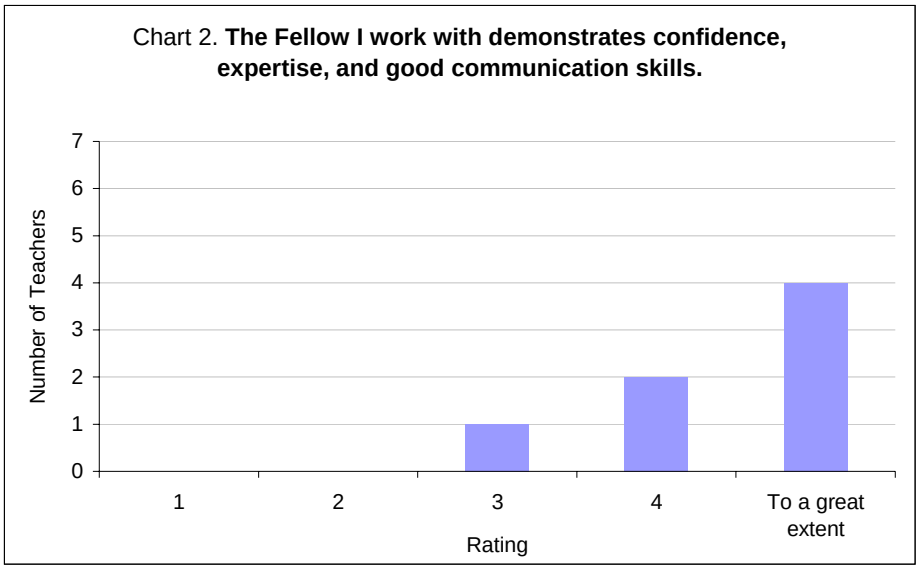


Figure 1 expresses the fellow's level of confidence in their ability to use various teaching techniques and importance of this ability. Fellows rated their ability as moderate to very important (55.6% moderately important, 44.4% very important) but they were split on the level of confidence in their ability.

Figure 1 Fellows ability to use teaching techniques

Confidence & Importance: Ability to Use a Variety of Instructional Techniques

Confidence		Importance	
Not Confident	0.0 %	Not Important	0.0 %
Slightly Confident	33.3 %	Slighty Important	0.0 %
Moderately Confident	33.3 %	Moderately Important	55.6 %
Very Confident	33.3 %	Very Important	44.4 %
Average Confidence	3.0		
Average Importance	3.4		
Gap Result	-0.4		

ISR observers rated the fellows' abilities as very high during observed classroom sessions (see Table 7), with a mean rating of 4.35 from 64 observations completed during the school year.

Table 7 Observers responses to fellows abilities

	Fellow demonstrates confidence, expertise, and communication skills.
N	64
Not Applicable	12
Mean	4.4
Minimum	2
Maximum	5

We asked the students a series of questions describing the fellows. Table 8 shows the average response from the students related 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 very high in almost every instance.

Table 8 Students responses about the fellows

The fellow…	Mean
Speaks clearly and can be easily understood.	4.5
Challenges me to think about the subject	4.2
Makes class interesting	4.3
Asks questions that help me understand the topic	4.3
Gives clear directions about assignments	4.3
Treats me with courtesy and respect	4.6
Is patient when working with me	4.5
Encourages me to participate in class discussion	4.3
Helps me solve problems and do my work.	4.3
Seems to like working with me.	3.9
Works well with my teacher.	4.5
Is friends with my teacher.	4.3

To what extent did the fellows benefit from the GK-12 project? The data from the surveys and observer ratings points out the fellows benefited from the project. Their educational experiences were enhanced and their communication skills improved. The

opportunities to teach, present, and direct experiments seems to have had more impact on the fellow's improved communication skills than the teacher's influence on the fellows.

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]?

When asked if students appear to be interested in learning the scientific method fellows were neutral on this question scoring a mean of 3.1. Teachers rated the student's interest toward the subject more negatively than the fellows (mean of 2.8, Table 9).

Table 9 Fellows and teacher's rating of student interest

	Fellow's responses: Students appear to be interested learning scientific method.	Teacher's responses: Students appear to be interested learning scientific method.
N	7	7
Mean	3.1	2.8
Minimum	2	1
Maximum	4	4

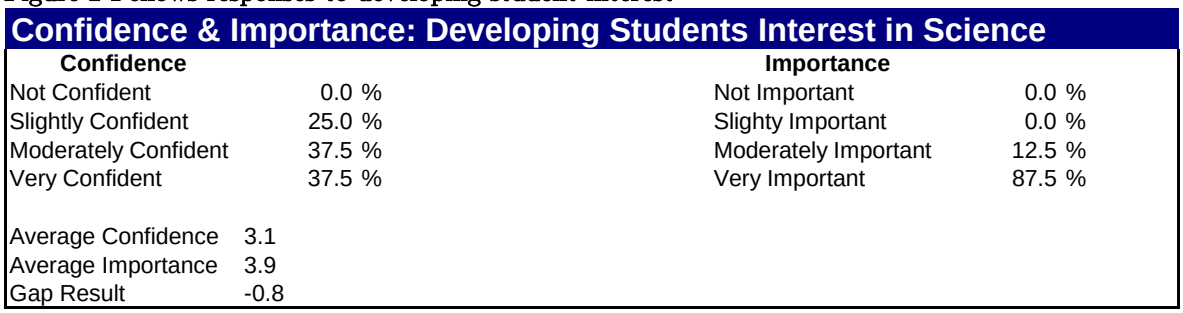
ISR observers were also asked to rate the student's interest in learning the scientific method. While observing class instruction by the fellows, ISR observers rated the interest level of the students as being interested to some extent (Table 10).

Table 10 Observers rating of student interest

	Students appear to be interested learning scientific method.
N	64
Not Applicable	1
Mean	3.5
Minimum	1
Maximum	5

Figure 2 shows the confidence and importance the fellows placed on the topic of developing students' interest in science. They rated the importance of the topic very high with an average score of 3.9 but they rated their confidence in developing the student's interest lower, with an average score of 3.1.

Figure 2 Fellows responses to developing student interest



We asked the students to describe their attitudes about science. A drawback to these responses was our lack of data on student attitudes prior to the start of the E-MRGE project. However, Table 11 shows the students taking our survey near the end of the school year generally had a positive attitude about the subject.

Table 11 Students attitudes about science

Students think…	Mean
Science is very interesting.	4.2
It is important for me to know about science in my daily life.	4.2
Boys and girls can be equally good at science.	4.3
Science is useful in solving every day problems.	3.6
I am good at science.	3.7

We also asked the students about their interests related to education and science. These questions received the lowest overall ratings from the students and the highest single rating. Thirty-nine (80%, a mean of 4.8) of the students strongly agreed they are interested in going to college. This was the highest positive response by the students in the survey. However, the students were less positive regarding their overall interest in science beyond middle school (Table 12).

Table 12 Students interests

I am interested in…	Mean
Discussing science with friends and family.	3.6
Reading articles about science in newspapers, magazines, or on the Internet.	3.4
Taking additional science courses beyond the required ones.	3.2
Going to college.	4.8
Majoring in a science-related field in college.	3.5
Joining a science club or organization.	3.1

Responses from the teachers, students, and observers indicate the project impacted the students in a positive manner. The fellow's responses in Figure 2 may indicate the fellows felt inadequate but they hope they are having a beneficial impact on the students. Teachers and ISR observers report the students are attentive and have positive attitudes toward the subject matter suggesting the fellows have had a positive impact. Responses from the students seem to indicate the students have had a positive experience in science class during the 2006-2007 school year.

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

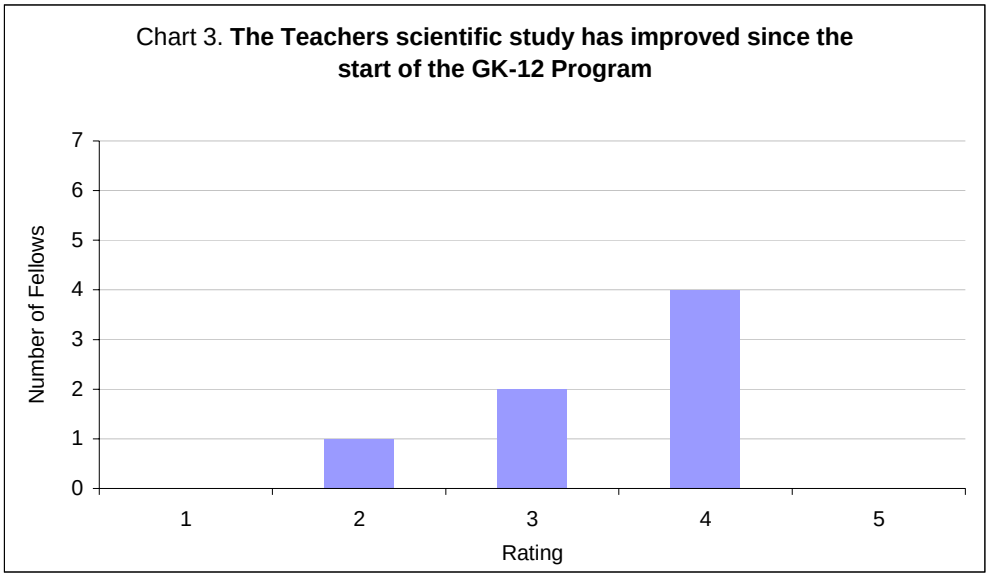
ISR observers reported the teacher's instructional content seemed to benefit somewhat from the fellow's contributions (Table 13).

Table 13 Observers responses: fellows benefit teachers

	Teachers instructional content benefits from the Fellow's contribution
N	64
Not applicable	9
Mean	3.7
Minimum	1
Maximum	5

The fellows were split in their judgment of the teachers' scientific study improving because of the E-MRGE project and the fellow's contribution (Chart 3).

Chart 3 Fellows response to teachers 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. Figure 3 shows the teachers felt this was very important (average rating of 3.9) but they are not as confident in their use of this technique in the classroom (average rating of 2.9).

Figure 3 Teachers use of inquiry-based techniques

Confidence & Importance: Use of Inquiry-Based Techniques

Confidence		Importance	
Not Confident	14.3 %	Not Important	0 %
Slightly Confident	14.3 %	Slightly Important	0 %
Moderately Confident	42.9 %	Moderately important	14.3 %
Very Confident	28.6 %	Very Important	85.7 %
Average Confidence	2.9		
Average Importance	3.9		
Gap Result	-1		

The teachers think they are very proficient at teaching facts, rules, and vocabulary. They rated their confidence on this question with an average score of 3.9, but the importance of teaching facts and vocabulary is not as important to the teachers. They gave this topic an average importance rating of only 3.4 (Figure 4).

Figure 4 Teachers responses to teaching facts

Confidence & Importance: Teaching Facts, Rules, and Vocabulary

Confidence		Importance	
Not Confident	0 %	Not Important	0 %
Slightly Confident	0 %	Slightly Important	14.3 %
Moderately Confident	14.3 %	Moderately important	28.6 %
Very Confident	85.7 %	Very Important	57.1 %
Average Confidence	3.9		
Average Importance	3.4		
Gap Result	0.4		

Overall, the GK-12 Project seems to have stimulated the teacher's awareness of their need to develop their teaching methods, and perhaps to emphasize student inquiry more and teaching science facts less. Teachers were very confident in their ability to teach facts and vocabulary but less sure of their ability to use inquiry-based technique as advocated by the GK-12 project. ISR observers were perhaps generous in rating the fellow's impact on the teachers. The fellows rated the teacher's improvement lower (mean of 3.4) in comparison to the observers. It might be the teachers feel a need to fall back on old teaching techniques when they teach facts and rules, because facts and rules involve the "tested" material students need to know for promotion.

Evaluation Question 4: To what extent did 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)?

Several issues are important if the E-MRGE Project is to be introduced in other locations in the state or expanded in Belen and Socorro. Adequate science equipment, materials, and the level of collaboration with UNM are necessary for the project to succeed and give students a hands-on inquiry-based learning experience. Adequate equipment and supplies is considered important to promote GK-12 beyond Belen and Socorro. ISR asked teachers and fellows several questions regarding the importance of

the need for supplies to make the GK-12 model succeed. Teachers felt that adequate supplies in the classroom are very important (mean of 4.9, Table 14). They split on the question of existing supplies in their classrooms, a mean of 2.9 rated less than to just adequate. Teachers also felt GK-12 cannot succeed without special equipment (mean of 2.9) and few teachers felt they had adequate classroom computers (mean of 1.7).

Table 14 Teacher responses to importance of supplies and equipment

	Adequate supplies are important	There are adequate supplies	GK-12 can succeed without special equipment	I have adequate computing equipment in classrooms
N	7	7	7	7
Mean	4.9	2.9	2.9	1.7
Minimum	4	1	2	1
Maximum	5	5	4	4

Teachers gave the project positive scores on the ability, knowledge, and science experience of the GK-12 fellows, but teachers agree equipment and materials are needed for complete success.

How supportive the teachers and fellows perceive their school and UNM stakeholders, is another issue related to promotion and expansion of the project. We asked teachers, if the UNM stakeholders had provided professional development resources to enhance science in the classroom. Teachers were slightly negative on the questions of whether UNM had provided professional resources to enhance science instruction (mean of 2.5, Table 15). The teachers may not see the fellows as a resource representative of UNM.

Table 15 Teacher responses to UNM resources

	UNM has provided resources to enhance science instruction
N	6
Missing	1
Mean	2.5
Minimum	2
Maximum	4

During the 2007 UNM Summer Intersession, one fellow organized and conducted a summer camp at the SNWR for several students from Belen Middle School. At least one other teacher and two fellows took part in the camp.

Plans for disseminating class activities include distribution to participant science teachers, statewide availability to other teachers, and posting information on the E-MRGE website.

Fellows also spent time during the summer reflecting upon their two semesters of classroom experiences and sharing these experiences at the 2007 Fall Orientation at SNWR. Fellows and project PI's continue planning the organization and production of lesson plans, conference presentations, and internet distribution of materials.

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 specific questions regarding inquiry-based instruction. Fellows acknowledged their exposure to inquiry-based learning was limited (6 no exposure or very limited exposure). Fellows agreed strongly that inquiry-based learning is important and they frequently use inquiry learning techniques in the classroom but their responses were split on just how effective inquiry learning is in the classroom (see Chart 4). Fellows also responded that inquiry-based teaching has affected student achievements (Chart 5). The fellows responded positively in the area of improved classroom activity. They felt inquiry-based teaching had not improved student projects, students using problem-solving techniques, or students being able to recall content.

Chart 4 Fellows rating effectiveness of inquiry module

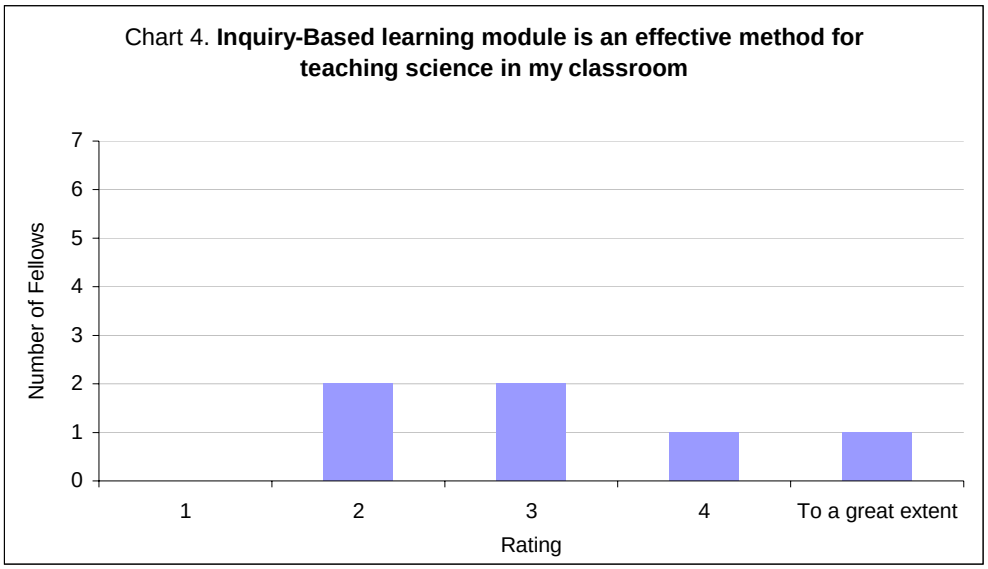


Chart 5 Fellows responses on gains using inquiry-based teaching

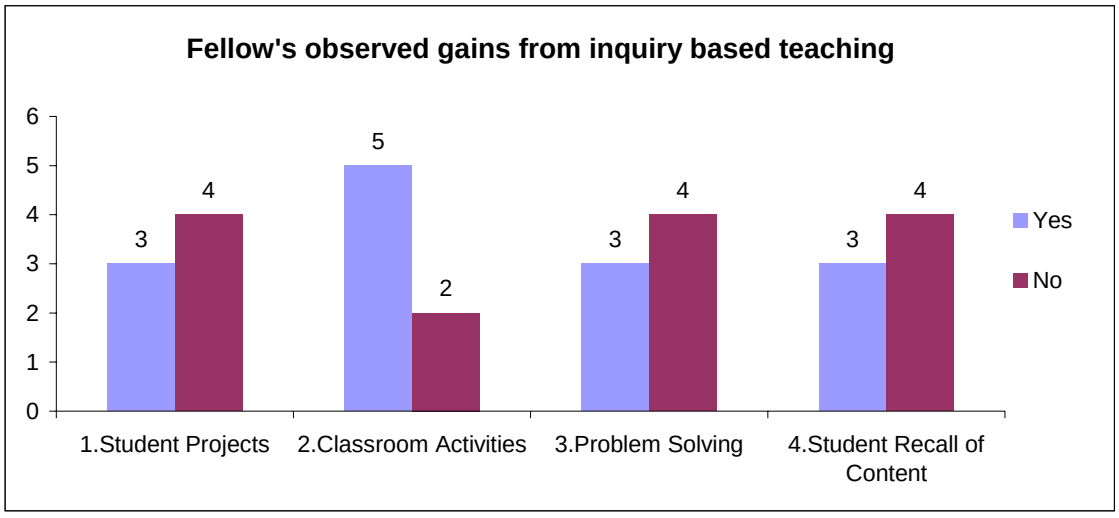
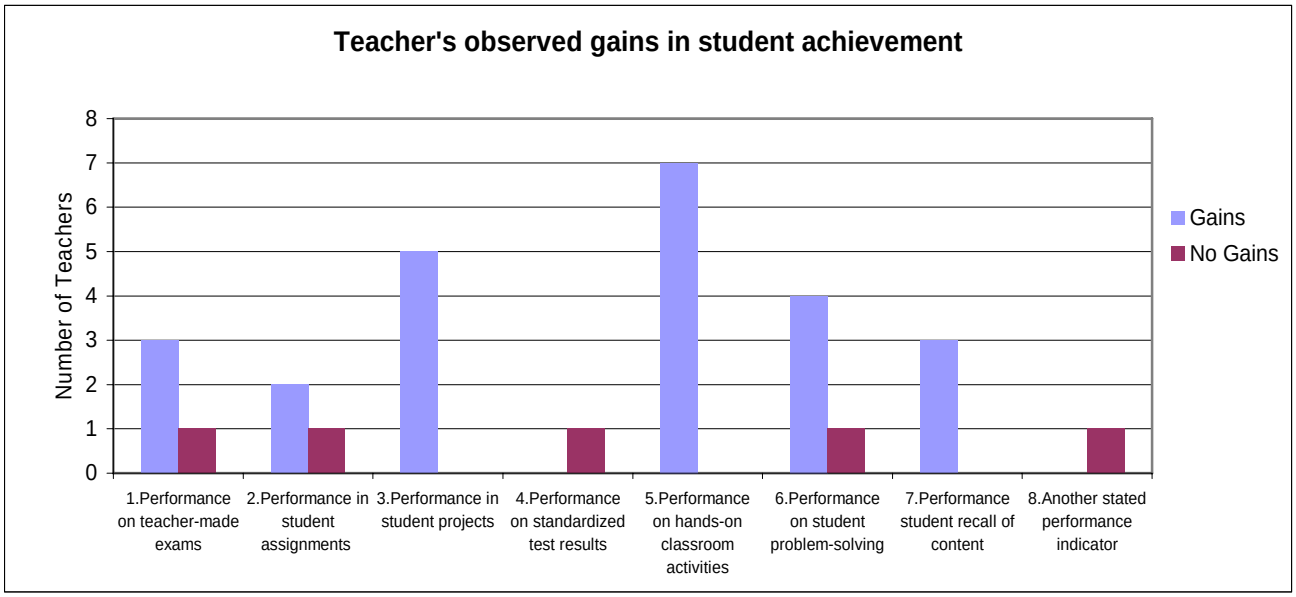


Chart 6 shows teacher's responses regarding specific gains they have seen in the classroom. Teachers report positive gains on teacher-made exams, student assignments, student projects, hands-on classroom activities, problem solving, and recall of content. Teachers agreed that inquiry-based instruction techniques have been effective in the classroom.

Chart 6 Teachers responses to gains from inquiry-based teaching



Teachers' responses were positive on the issue of inquiry-based teaching. Teachers reported having limited exposure to the inquiry technique (mean of 3.3). They feel it is important (mean of 4.4), they use the technique in the classroom, and they seem to think inquiry learning is effective (mean of 3.7, Table 16).

Table 16 Teachers responses to inquiry-based

	Been exposed to Inquiry-Based Learning Module	The Inquiry-Based Learning Module is Important	Use of Inquiry-Based Techniques	Inquiry-Based Learning module is effective in the classroom
N	7	7	7	7
Missing	0	0	0	1
Mean	3.3	4.4	3.4	3.7
Minimum	2	3	2	2
Maximum	5	5	5	5

ISR observers also rated the teacher and fellow's use of inquiry-based techniques. Table 17 illustrates that in general the observers saw the teachers using inquiry techniques to some extent during classroom sessions. Inquiry techniques are not used in the classroom exclusively. The number of missing data points in Table 17 demonstrates this point. Missing data signifies during observation sessions inquiry-based learning techniques were not used for various reasons, e.g., the teacher or fellow did not present material using inquiry techniques during the class, the class lesson consisted of a vocabulary or test review, or a quiz was given during the class session.

Table 17 Observers responses to teachers using inquiry-based techniques

	Teachers encourage the students to use hands-on interactive techniques	Students are allowed to discover on their own and work in groups
N	64	64
Missing	7	10
Mean	4.0	3.9
Minimum	1	1
Maximum	5	5

Inquiry based techniques are important to the E-MRGE project. Fellows, teachers, and observers have noted inquiry techniques are being used in the classrooms by the project participants and seem to be having a positive impact on the students.

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?

All seven fellows attended the preliminary orientation session before the school term began. The fellows reported having a positive attitude about the GK-12 project before it began (mean of 4.3). At the time of the survey, all the fellows reported a slightly less positive attitude toward the project, mean of 4.1 (Table 18).

Table 18 Fellows attitude toward project

	Attitude about program before it began	Current attitude about program
N	7	7
Mean	4.3	4.1
Minimum	3	2
Maximum	5	5

In the survey, the fellows were neutral on the issue of the orientation (Table 19). Fellows offered suggestions for improving the seminar: 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 19 Fellows attitude toward orientation

	The Orientation was helpful
N	7
Mean	2.6
Minimum	2
Maximum	4

Fellows participated in the orientation event and they reported having a good attitude about the E-MRGE project.

Conclusion

Survey findings and observer ratings show the fellows benefited from the project as their educational experience and communication skills improved. The activity of teaching and presenting experiments seems to have affected the fellow's more than the teacher's guidance. ISR observers and the fellows reported the students were somewhat attentive to the fellows and had positive attitudes toward learning science. The GK-12 Project seems to have impressed teachers and increased their practice of using the inquiry-based teaching technique. Fellows, teachers, and observers noted inquiry techniques are being used in the classrooms and seem to be having a positive impact on the students. Teachers feel equipment and materials are important to teach students and the E-MRGE project has provided resources to the schools but the teachers do not associate UNM support with routine support in the local schools. Project PI's are involved in the project, recruiting qualified fellows, making efforts to match fellows to teachers, and beginning with the 2007 Fall Semester, will require the fellows to manage their time on the project better. Additionally, the PIs anticipate holding planning sessions and meetings routinely with the fellows.

The evaluation process is restricted by the fact we cannot collect student test scores from the teachers and a specific pre/post test to measure precisely the impact of the E-MRGE project goals would have enriched the findings of the progress report.

This Progress Report indicates teachers need additional resources and practical examples demonstrating the use of inquiry-based teaching methods in the classroom. The value of inquiry-based techniques seems beneficial to the students as they discover science, but inquiry techniques require thoughtful planning.

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 Students are allowed to discover on their own with Teacher guidance; work in groups	1	2	3	4	5	6
3 Students appear to be interested; learning scientific method.	1	2	3	4	5	6
4 Teacher and Fellow plan together before class.	1	2	3	4	5	6
5 Fellow demonstrates confidence, expertise, and communication skills.	1	2	3	4	5	6
6 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 in my classroom.	1	2	3	4	5
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

Next 3 Questions for Belen, Socorro, and Laguna Teachers only

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

Next 2 Questions for Albuquerque Teachers only

67	My understanding of the GK-12 Program would benefit from a formal Orientation about the program.	1	2	3	4	5
68	Handouts and materials about the GK-12 Program would be helpful to me.	1	2	3	4	5

SECTION III – COLLABORATION AND PROFESSIONAL DEVELOPMENT

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

___ Yes
___ No

70. 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

71. 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 _____

72. 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.

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

Strongly Disagree	Disagree	Agree	Strongly Agree

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

Strongly Disagree	Disagree	Agree	Strongly Agree

75. 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

76. 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 _____

E-MRGE Belen, Socorro, and Laguna Fellows answer Questions 59- 61.

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?

_____

_____

Optics & Photonics Albuquerque Fellows answer Questions 62-63.

62. The Seminars facilitated by the APS Program Manager were helpful.

Strongly Disagree	Disagree	Agree	Strongly Agree

63. What would you do to improve the Seminars?

_____

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

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

Strongly Disagree	Disagree	Agree	Strongly Agree

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

Strongly Disagree	Disagree	Agree	Strongly Agree

66. 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