
South Bay Geo-Diversity Project Evaluation Report

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South Bay Geo-Diversity Project

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South Bay Geo-Diversity Project Evaluation Report

Executive Summary

The South Bay Geo-Diversity Project (SBGDP) is a multi-faceted, multi-level initiative to increase the participation of underrepresented groups in geo-science education and research. During the summer of 2003, twelve participants attended a two-week intensive workshop experience, designed to improve their knowledge of topics in earth and space sciences. The same group participated in activities during the 2003-2004 academic year designed to increase their proficiency in mentoring, tutoring, and coaching students in earth and space science topics.

The participants in the South Bay GeoDiversity Project were primarily classroom teachers, half of who were in their first decade of teaching. Many had taught multiple subjects during their careers and had some experience in teaching earth and space sciences. The majority had ten or less courses in sciences in the academic background. Additionally, while they had some academic experiences with general geology and environmental studies, most lacked depth in training in geosciences (particularly in rocks and minerals, topographic and geologic maps, and general geology concepts).

The summer workshop component was designed to provide classroom teachers with experiences in geological sciences, in a classroom setting as well as in the field. The academic year activities provided support for mentoring and coaching experiences.

By partnering with the SJSU M.E.S.A. project during the academic year, the principal investigators were able to reach a broader audience and to impact the quality of teaching and learning in high school and community college geoscience classrooms.

Overall, the qualitative and quantitative data gathered during the project indicates that the BAESI South Bay Geo-Diversity Project was highly effective in increasing teachers' knowledge of geosciences and in improving their confidence to teach earth and space sciences.

South Bay Geo-Diversity Project Evaluation Report

Introduction

The South Bay Geo-Diversity Project (SBGDP) is a multi-faceted, multi-level initiative to increase the participation of underrepresented groups in geo-science education and research. The primary objectives of the South Bay Geo-Diversity Project are to:

- 1.) team with San José State University's MESA (Mathematics, Engineering, Science Achievement) Program to provide under-represented middle school and high school students with summer and academic year enrichment activities in geosciences,
- 1.) partner with San José City College and National Hispanic University to enhance student participation in the geosciences by engaging them in active learning experiences and raising their awareness of educational and career opportunities;
- 1.) involve selected high school and college students in research projects,
- 1.) supply year round mentoring and retention activities for students at all levels,
- 1.) offer professional development workshops for middle and high school teachers, and
- 1.) support these teachers' instruction of geosciences with appropriate materials.

Evaluation Overview

In evaluating the effectiveness of the overall South Bay Geo-Diversity Project and its components assessment was made of the pre- and post-program through surveys. Participants' knowledge base and teaching experience were evaluated using the pre-workshop survey. This data was used to select topics for the summer workshop series and allowed the presenters to better meet the educational needs of the participants.

During the two-week summer workshop (July 21st to August 1st, 2003), a Kirkpatrick Level I/Level II assessment was conducted at the conclusion of each activity. The purpose of this data was to assess participants' satisfaction with the activities and to adjust components of the summer educational experience to better meet participants' needs.

Finally, a post-program survey was conducted to assess participants' learning and their overall satisfaction with the summer program and its components.

Participants

i. General Demographic Data

Participants in the Summer 2003 South Bay GeoDiversity Project can be described as 50% male and 50% females. By age, the participants can be divided as follows: 8% in the 21 to 30 year old range, 42% in the 31 to 40 year old range, 8% in the 41 to 50 year old range, and 43% over 51 years of age.

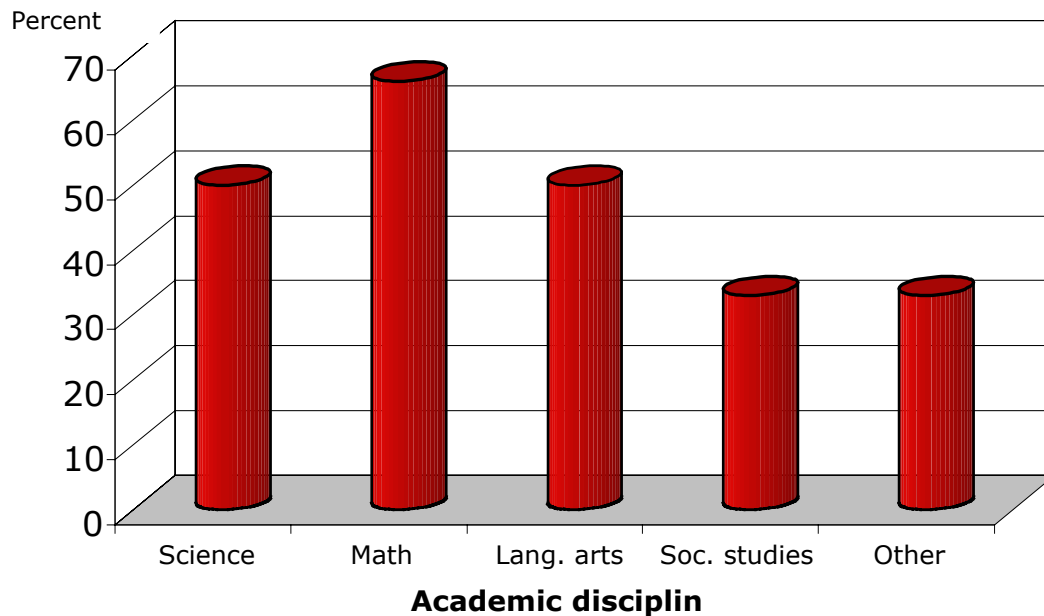
In terms of teaching experience, 7 of the 12 participants or 58% were credentialed teachers. Two of the 12 participants or 16% were teaching interns. The remaining three participants (25%) were in paraprofessional teaching support roles in schools.

i. Teaching Experience

In terms of teaching experience, the majority of the participants (7 of 12) were in their first ten years of teaching. Two of the participants had 11 to 20 years experience in the classroom. Finally three of the participants or 25% had twenty or more years of teaching experience.

All of the participants had experience teaching in multiple academic assignments. The distribution of teaching experiences is shown in Figure 1 below:

Figure 1. Distribution of Participants Teaching Experience By Academic Discipline



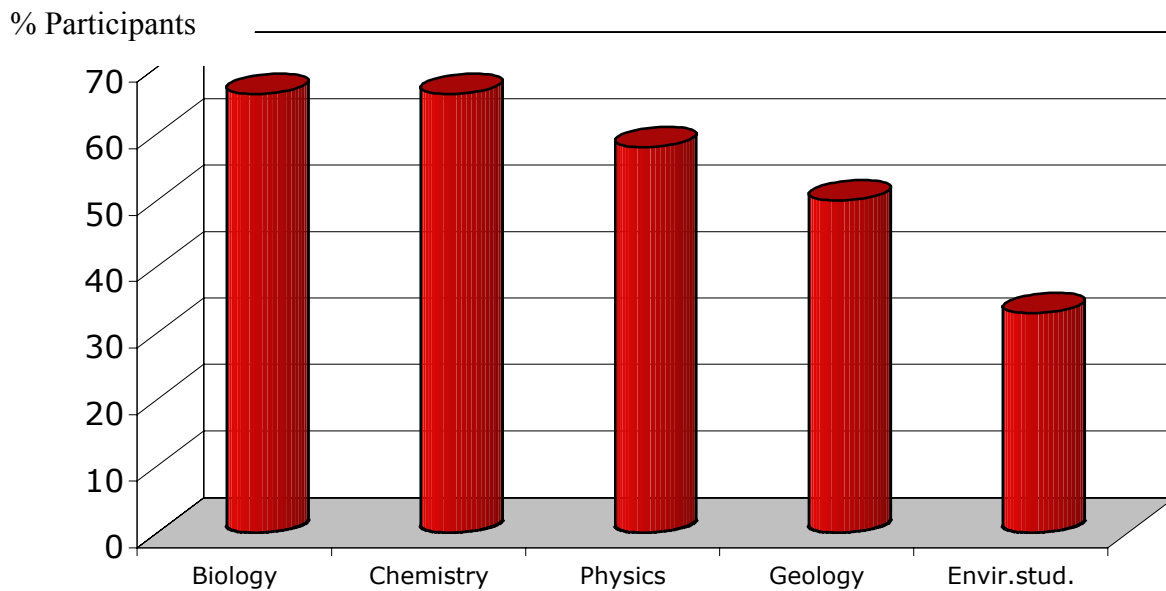
iii. Academic Background

In terms of science background, the participants in the South Bay Geodiversity Project can be described as follows:

- 58% (n=7) 0 to 10 university level courses in science
- 8% (n=1) 11 to 19 university level courses in science
- 33% (n=4) 20 or more university level courses in science.

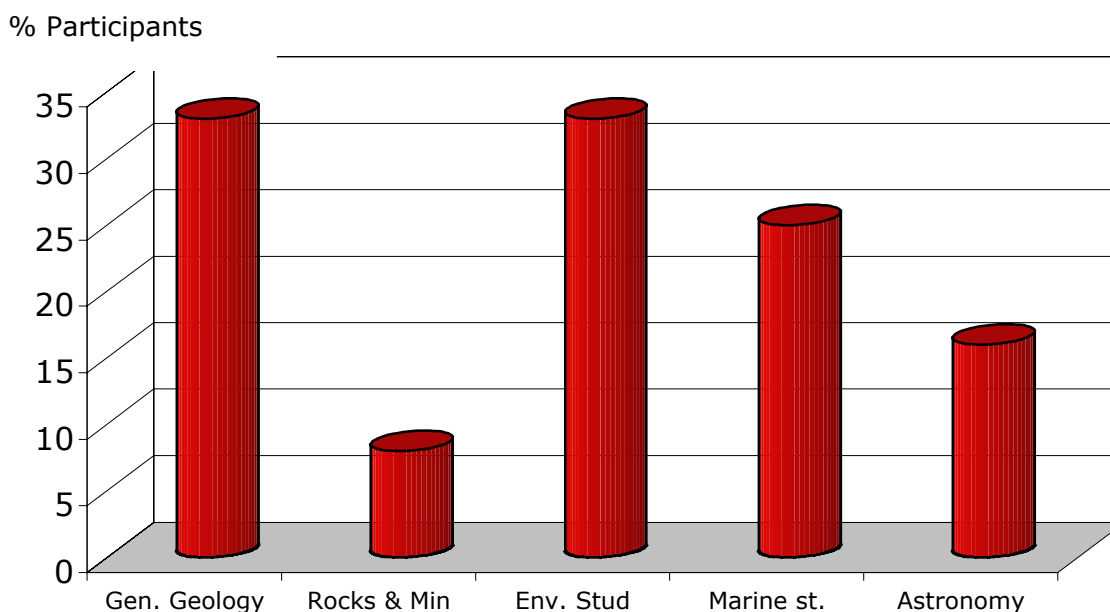
Participants' knowledge base in sciences is depicted in Figure 2 below. That graph shows the percentage of participants who have completed courses in each science discipline.

Figure 2. Distribution of Participants Science Background by Science Field



Within the earth and space sciences, participants have had varied academic experiences. Figure 3 below shows the distributed of courses in earth and space sciences completed by the South Bay Geodiversity Project participants (in percent of participants who've had such a course).

Figure 3. Distribution of Earth and Space Science Courses Completed by South Bay GeoDiversity Project Participants



It is interesting to note that none of the participants had course work in fossils and ancient life, tectonics, geochemistry, hydrogeology or geomorphology.

iv. Self-Efficacy in Teaching Geosciences

In measuring participant's confidence in teaching topics in earth and space science, a general inventory was administered to. Each participant was asked to assess their confidence to teach topics in earth and space science. Self-efficacy or confidence to teach is frequently identified as the most important variable in teachers' success in the classroom (Henson, 2003; Verdinelli, 2003, Morrell, 2003).¹

¹ Henson, R.K., et. al.(2003), Personality Type As a Predictor of Teaching Efficacy and Classroom Control in Emergency Certification Teachers. *Education* 124 (2) ,261-8.

² Verdinelli, S. (2003) Changes in Teaching Philosophies Among In-Service Teachers After Experiencing Mastery Learning. *Action in Teacher Education*. 25 (2), 56-66.

³ Morrell, P.D., (2003). An Extended Examination of Preservice Elementary Teachers' Science Teaching Self-Efficacy. *School Science and Mathematics*. 103 (5)246-51.

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The results of that assessment are shown in Table 1 below:

Table 1. Measures of Personal Knowledge and Self-Efficacy in Geoscience Teaching

Personal Knowledge and Teaching Efficacy	Excellent	Good to Very Good	Satisfactory	Poor	None
General Knowledge					
I'd rate my personal knowledge of general geology as:	0 (0%)	0 (0%)	7 (58%)	3 (25%)	2 (16%)
I'd rate my ability to teach general geology as:	0 (0%)	1 (8%)	6 (50%)	3 (26%)	2 (16%)
Rocks and Minerals					
I'd rate my personal knowledge of rocks and minerals as:	0 (0%)	2 (16%)	4 (33%)	6 (50%)	0 (0%)
I'd rate by ability to teach rocks and minerals as:	0 (0%)	2 (16%)	6 (50%)	3 (25%)	1 (8%)
Fossils and Ancient Life					
I'd rate my personal knowledge of fossils and ancient life as:	0 (0%)	0 (0%)	4 (33%)	7 (58%)	1 (8%)
I'd rate my ability to teach concepts associated with fossils and ancient life as:	0 (0%)	0 (0%)	4 (33%)	7 (58%)	1 (8%)
Environmental Sciences					
I'd rate my personal knowledge of environmental sciences as:	0 (0%)	3 (25%)	4 (33%)	4 (33%)	1 (8%)
I'd rate my ability to teach concepts associated with environmental sciences as:	0 (0%)	5 (42%)	3 (25%)	2 (16%)	2 (16%)
Landforms					
I'd rate my personal knowledge of landforms and geological processes as:	0 (0%)	2 (16%)	4 (33%)	4 (33%)	2 (16%)
I'd rate my ability to teach concepts associated with landforms and geological processes as:	0 (0%)	3 (25%)	4 (33%)	3 (25%)	2 (16%)
Space and Astronomy					
I'd rate my personal knowledge of concepts associate with space and astronomy as:	1 (8%)	0 (0%)	6 (50%)	3 (25%)	2 (16%)
I'd rate my ability to teach concepts associated with space and astronomy as:	1 (8%)	2 (16%)	4 (33%)	3 (25%)	2 (16%)
Oceans and Marine Studies					
I'd rate my personal knowledge of oceans and marine studies as:	1 (8%)	1 (8%)	4 (33%)	4 (33%)	2 (16%)
I'd rate my ability to teach concepts associated with oceans and marine studies as:	1 (8%)	2 (16%)	4 (33%)	3 (25%)	2 (16%)
Topographic & Geologic Maps					
I'd rate my personal knowledge of topographic and geologic maps as:	0 (0%)	1 (8%)	4 (33%)	5 (42%)	2 (16%)
I'd rate my ability to teach concepts associated with topographic and geologic maps as:	0 (0%)	3 (25%)	2 (16%)	5 (42%)	2 (16%)

v. Summary Pre-Participation Profile

In terms of their teaching abilities in earth and space sciences, the majority of the teachers in the South Bay GeoDiversity Project, entered the two-week intensive summer workshop only marginally prepared to teach earth and space sciences. Ninety two percent of the participants rated themselves as having no confidence, poor ability or satisfactory in their ability to teach geosciences. Only eight percent of the participants rated themselves as being good to excellent in their ability to teach earth and space sciences.

From the pre-participation survey it was determined that participants were in need of experiences and/or educational opportunities in three areas: general geology, rocks and minerals and topographic and/or geologic maps. Therefore, summer workshops were tailored to meet participants' needs in these areas.

vi. Scope and Sequence of Summer Workshop Activities

The two-week South Bay GeoDiversity Project summer workshop was held during the weeks of July 21st to August 1st, 2003. The participants met three hours each day. A list of activities is provided in Table 2 below:

Table 2. Overview of Summer Workshop Activities

Week #1	Activities
Monday	Welcome, Overview Introduction to Earth Materials Crystal Growth
Tuesday	Crystals Minerals and their identification
Wednesday	Igneous rocks and their formation Sedimentary rocks
Thursday	Metamorphic rocks Tour of building stones in San Jose
Friday	Rock Cycle Crystal growing contest
Week #2	Activities
Monday	Introduction to Topographic maps
Tuesday	3-D visualizations of topography Topographic map practice
Wednesday	Topographic map profiles More work on topographic maps
Thursday	Plate tectonics Rocks of the Bay Area Geologic maps and cross sections
Friday	Field trip to Santa Teresa Hills Map construction and cross sections

Evaluation of Summer Workshop Activities

Workshop components and/or activities were selected for participant analysis. These components were assessed using a Kirkpatrick Level I/Level II evaluation instrument. The purpose of the assessment was to determine if the activities were meeting participants' educational needs and to determine if the activities were appropriate for the target audience.

Based on participant feedback, modifications in instruction were made throughout the workshop period in order to better match instruction with participant expectation and/or educational background. Additionally, data from the feedback form provided information of the quality of workshop activities. Table 3 below provides a summary of activities and corresponding evaluation instruments.

Table 3. Overview of Evaluated Activities & Components

Week #1	Activities	Evaluated Components
Monday	Welcome, Overview	- Pre-workshop survey
	Introduction to Earth Materials	-
	Crystal Growth	-
Tuesday	Crystals	- Kirkpatrick Level I/Level II
	Minerals and their identification	-
Wednesday	Igneous rocks and their formation	-
	Sedimentary rocks	-
Thursday	Metamorphic rocks	-
	Tour of building stones in San Jose	- Kirkpatrick Level I/Level II
Friday	Rock Cycle	-
	Crystal growing contest	-
Week #2	Activities	
Monday	Introduction to Topographic maps	-
Tuesday	3-D visualizations of topography	- Kirkpatrick Level I/Level II
	Topographic map practice	-
Wednesday	Topographic map profiles	-
	More work on topographic maps	-
Thursday	Plate tectonics	-
	Rocks of the Bay Area	-
	Geologic maps and cross sections	-
Friday	Field trip to Santa Teresa Hills	-
	Map construction and cross sections	- Post-workshop survey

Evaluation of Crystals Activity

Typical feedback was generated from the Crystal activity. This activity was conducted on the second day of the workshop and revisited on the fifth day of the workshop.

At the conclusion of the activity, participants were given a one-page rapid feedback form, consisting of six evaluation criteria and an open response area. Data from that feedback is provided in Table 4 below:

Table 4. Evaluation of Crystals Activity

Statement(s)	Number (Percent) of Participants Responding			
	Excellent	Good	Satisfactory	Needs Improvement
PLANNING. In my opinion this activity was:	7 (64%)	4 (36%)	0 (0%)	0 (0%)
EDUCATIONAL VALUE. In my opinion the educational value of this activity could be described as:	9 (82%)	2 (18%)	0 (0%)	0 (0%)
ARRANGEMENTS. In my opinion the physical arrangements for this activity were:	7 (64%)	4 (36%)	0 (0%)	0 (0%)
QUALITY OF PRESENTATION. In my opinion the quality of this presentation could be described as:	5 (45%)	6 (55%)	0 (0%)	0 (0%)
CONTRIBUTION TO INQUIRY BASED SCIENCE. I would describe this activity's ability to contribute to my overall knowledge of geological sciences as:	7 (64%)	4 (36%)	0 (0%)	0 (0%)
CONTRIBUTION TO INQUIRY BASED SCIENCE. In terms of contributing to my knowledge of inquiry based science, I would rate this activity as:	10 (91%)	1 (9%)	0 (0%)	0 (0%)
<p>Participant Comments:</p> <ul style="list-style-type: none"> • "Excellent activity" • "This activity was excellent. I want to know how to identify various crystals and solutions." • "This activity was extremely interesting. Coming from a non-science background I learned quite a lot in a short amount of time." 				

Evaluation of Sandwich Tray Activity

The sandwich tray activity was used during the second week of the workshop as a way of teaching participants about topographic and/or geologic maps. The activity was evaluated with the one-page rapid feedback form. Participant responses were tallied and are reported in Table 5 as simple univariate statistics.

Table 5. Evaluation of the Sandwich Tray Activity

Statement(s)	Number (Percent) of Participants Responding			
	Excellent	Good	Satisfactory	Needs Improvement
PLANNING. In my opinion this activity was:	9 (75%)	3 (24%)	0 (0%)	0 (0%)
EDUCATIONAL VALUE. In my opinion the educational value of this activity could be described as:	10 (84%)	2 (16%)	0 (0%)	0 (0%)
ARRANGEMENTS. In my opinion the physical arrangements for this activity were:	9 (75%)	3 (24%)	1 (8%)	0 (0%)
QUALITY OF PRESENTATION. In my opinion the quality of this presentation could be described as:	7 (58%)	5 (42%)	0 (0%)	0 (0%)
CONTRIBUTION TO INQUIRY BASED SCIENCE. I would describe this activity's ability to contribute to my overall knowledge of geological sciences as:	10 (84%)	2 (16%)	0 (0%)	0 (0%)
CONTRIBUTION TO INQUIRY BASED SCIENCE. In terms of contributing to my knowledge of inquiry based science, I would rate this activity as:	10 (84%)	2 (16%)	0 (0%)	0 (0%)
<p>Participant Comments:</p> <ul style="list-style-type: none"> • "Eureka! Coupled with the thorough lesson on topographic maps, the follow-up activity really brought it all together. My students will have a great time!" • "Great Activity!" • "Very good for visual dimension" • "Some of the vocabulary was challenging. But 3-D is a lot of fun and helpful to my brain." • "The entire lesson was focused and full of information. Thanks" 				

Evaluation of Summer Field Experiences

Field experiences were woven into the summer workshop experiences. These experiences were evaluated with the same Kirkpatrick Level I/Level II evaluation instruments that were used for the "in-class" components. Again, this evaluation served as formative evaluation for the workshop series and as a summative evaluation of the activity itself.

The Building Stone Tour was a walking tour of San Jose, California. The purpose of the tour was to identify rocks and minerals that are routinely used as building materials. Participants evaluation of this activity are shown as simple univariate statistics in Table 6 below:

Table 6. Evaluation of the Building Stone Tour

Statement(s)	Number (Percent) of Participants Responding			
	Excellent	Good	Satisfactory	Needs Improvement
PLANNING. In my opinion this activity was:	10 (84%)	2 (16%)	0 (0%)	0 (0%)
EDUCATIONAL VALUE. In my opinion the educational value of this activity could be described as:	10 (84%)	2 (16%)	0 (0%)	0 (0%)
ARRANGEMENTS. In my opinion the physical arrangements for this activity were:	9 (76%)	3 (24%)	0 (0%)	0 (0%)
QUALITY OF PRESENTATION. In my opinion the quality of this presentation could be described as:	9 (76%)	3 (24%)	0 (0%)	0 (0%)
CONTRIBUTION TO INQUIRY BASED SCIENCE. I would describe this activity's ability to contribute to my overall knowledge of geological sciences as:	11 (92%)	1 (8%)	0 (0%)	0 (0%)
CONTRIBUTION TO INQUIRY BASED SCIENCE. In terms of contributing to my knowledge of inquiry based science, I would rate this activity as:	10 (84%)	2 (16%)	0 (0%)	0 (0%)
<p>Participant Comments:</p> <ul style="list-style-type: none"> • "The tour was academically, physically, and experientially stimulating. Thank you for your excellent language and scientific learning." • " I'll recommend to my students that they take along the ID packets until they get better at identification. (I forgot to)." • "A good "hands-on" extemporaneous exercise." • "Great way to provide insights into classroom activities." • "It would have been helpful if the packet included the flow-charts. It was fun though." 				

Comparing Summer Educational Experiences

To further evaluate the effectiveness of the summer workshop activities a comparison was made of the participant evaluations of various activities. The rating scales (Excellent, Good, Satisfactory, and Needs Improvement) were converted to a numeric scale (4, 3, 2, 1) and the mean scores of participants are compared across activities. See Table 7 below:

Table 7. Comparison of Mean Scores or Ratings of Summer Project Activities

Category of Review	Crystal Activity	Sandwich Tray Activity	Common Minerals	Building Stone Tour
Planning	3.64	3.75	4.00	3.83
Educational Value	3.82	3.83	3.83	3.83
Arrangements	3.64	3.92	3.83	3.75
Quality of Presentation	3.45	3.31	3.83	3.75
Contribution to Overall Inquired - based Geosciences	3.64	3.83	3.92	3.92
Contribution to Knowledge of Inquiry Based Science	3.91	3.83	3.92	3.83

Comparing activities side-by-side it becomes apparent that the "Common Minerals" activity had the highest overall rating and was perceived by participants to be the "best planned" and implemented. Participants viewed the educational value of all activities to be equally valuable. Two activities, "Crystals" and "Sandwich Trays", were rated lower than the others. All of the activities were highly rated by the participants and should be retained in future projects dealing with a similar audience.

End of Summer Evaluation

The overall workshop was evaluated on the last day using a post-workshop survey form. Questions on that survey were designed to focus on the areas identified in the needs assessment as being most crucial to participants' understanding of geosciences.

Participants' responses and written comments on the open-response questions are reported in the Table 8 below:

Table 8. Measures of Personal Knowledge and Self-Efficacy in Geoscience Teaching at the end of the Workshop²

Personal Knowledge and Teaching Efficacy	Excellent	Good to Very Good	Satisfactory	Poor	None
General Knowledge					
I'd rate my personal knowledge of general geology as:	0 (0%)	7 (70%)	3 (30%)	0 (0%)	0 (0%)
I'd rate my ability to teach general geology as:	0 (0%)	7 (70%)	3 (30%)	0 (0%)	0 (0%)
Rocks and Minerals					
I'd rate my personal knowledge of rocks and minerals as:	0 (0%)	7 (70%)	3 (30%)	0 (0%)	0 (0%)
I'd rate by ability to teach rocks and minerals as:	0 (0%)	5 (50%)	5 (50%)	0 (0%)	0 (0%)
Topographic & Geologic Maps					
I'd rate my personal knowledge of topographic and geologic maps as:	0 (0%)	7 (70%)	3 (30%)	0 (0%)	0 (0%)
I'd rate my ability to teach concepts associated with topographic and geologic maps as:	0(0%)	7 (70%)	2 (20%)	1 (10%)	0 (0%)
<p>Workshop Evaluation Identify three strengths of the South Bay Geo-Diversity workshop series:</p> <ul style="list-style-type: none"> • "It enhanced my personal knowledge", "Content" • "Excellent planning, excellent instruction, lots of reinforcement of skills.", "Great Resources" • " It provided me a good opportunity to develop activities that I can take back to class." • " It was well oriented to meet the needs of the participants.", "High level academic knowledge base for participants." • " Very knowledgeable instructors.", "Great instructors.", "Excellent teachers" • " Lots of hands-on work.", "Hands-on activities." • "Lots of samples/worksheets to take back to class and use.", "Connection between theory and class activities.", "Activities were interesting" • "It would be great if more teachers could participate in this.", "Pleasant learning environment" 					
<p>Identify three areas to improve in the South Bay Geo-Diversity workshop series:</p> <ul style="list-style-type: none"> • " Provide more notes" • "More time on activities.", "More time", • "More chances to practice." • "More discussion of "gold, diamonds, and oil." • "Personally I hated the long commute to get here." • ""Sorry I can't think of any" • "More hours in order not to feel totally overwhelmed." 					

² Note: Not all participants evaluated the end of the workshop activity. Two participants were absent the last day.

Please provide any written feedback that you wish to include regarding the overall workshop:

- "It should be a three week course compared to two weeks"
- "Add more field trips to different sites for more comparison study."
- "I really enjoyed the workshop format."
- "It moved rapidly and was never boring."
- "It has been 17 years since I took a geology class. This workshop was wonderful it brought back really good feelings and wonderment. Excellent workshop."
- "Well work the trip"
- "Very good workshop overall! Thanks for providing us with this!"
- "This was a great workshop"
- "I had a wonderful time. Being from a totally non-science background, I loved this experience and hope to be able to learn more in order to teach kids for MESA."

vii. Academic Year Field Trip

Academic year activities were developed to complement the summer workshop activities and other project components. For example, Phil Stoffer of the United States Geological Survey conducted a field trip to Castle Rock State Park and Sanborn County Park on October 18, 2003. This field trip was evaluated using an instrument similar to the one used to evaluate summer activities. Findings are shown in Table 9 below:

Table 9. Evaluation of MESA/BAESI Field Trip

	Number (Percent) of Participants Responding			
How effective was this field trip in teaching you earth science concepts?	Very effective 21 (60%)	Effective 13 (37%)	Somewhat effective 1 (3%)	Not at all effective 0 (0%)
How useful was this field trip in giving you ideas and strategies you can use in your science classes? (ONLY teachers answered this question)	Very useful 14 (67%)	Useful 5 (24%)	Somewhat Useful 2 (9%)	Not at all useful 0 (0%)
How difficult was the academic content of this presentation?	Very difficult 0 (0%)	Somewhat difficult 7 (20%)	About right 23 (66%)	Easy 4 (14%)
How would you rate the trip leaders in terms of being prepared, presenting information clearly and effectively and responding to questions?	Outstanding 28 (80%)	Good 7 (20%)	Mediocre 0 (0%)	Poor 0 (0%)

Written Comments: The most frequent comment (made by 1/3 of the participants) was that the group size of 35 was too large for participants to see everything and/or hear leader comments.

Data from the field trip to Castle Rock and Sanborn State Parks indicates that the majority of participants viewed this as a very effective activity in terms of teaching them science concepts. The majority of classroom teachers on the trip viewed the field experience as highly useful in providing them with ideas and strategies for teaching science in their own classrooms. The majority of participants viewed the academic content as about right based on their own level of scientific knowledge. Finally, the field trip leader was viewed as having done an outstanding job in terms of being prepared, presenting information clearly and effectively, and responding to participant questions.

viii. Long-term Effects

In measuring the long-term effects of the South Bay GeoDiversity Project an end of project survey was conducted during March 2004. This survey included the same questions on knowledge and/or self-efficacy in teaching and learning as the pre-workshop survey. The effectiveness of the overall activities involved a comparison was made of the participants' general knowledge, knowledge of rocks and minerals, and topographic and geologic maps. The scale (Excellent, Good to Very Good, Satisfactory, Poor, and None) was converted to a numeric scale (4, 3, 2, 1, and 0) and the mean scores of participants are compared.

It should be noted that only six of the participants in the summer workshop completed the survey, the remaining participants left the project as a result of budget cuts in local school districts. This high attrition rate was unseen at the beginning of the project and was the result of State legislative action outside the realm of the principal investigator's sphere of influence.

The comparison of pre-and post-project activities is shown in Table 10:

Table 10. Comparison of Pre-and Post-Workshop Knowledge and Teaching Efficacy

Personal Knowledge & Teaching Efficacy	Pre	Post	Change
General Knowledge			
I'd rate my personal knowledge of general geology as:	1.41	2.50	+1.09
I'd rate my ability to teach general geology as:	1.50	2.50	+1.00
Rocks and Minerals			
I'd rate my personal knowledge of rocks and minerals as:	1.67	2.50	+0.83
I'd rate by ability to teach rocks and minerals as:	1.75	2.67	+0.92
Topographic & Geologic Maps			
I'd rate my personal knowledge of topographic and geologic maps as:	1.33	2.50	+1.17
I'd rate my ability to teach concepts associated with topographic and geologic maps as:	1.50	2.00	+0.50

From the data it is apparent that the largest change in participants' knowledge was in the area of their general knowledge of geology and knowledge of topographic and/or geologic maps. In terms of teaching efficacy or confidence in their ability to teach, the greatest change came in the area of participants' ability to teach general geology. All participants reported growth in their personal knowledge of geosciences and in their ability to teach concepts in geosciences.

ix. Summary

The primary objectives of the South Bay Geo-Diversity Project were to:

- 1.) team with San José State University's MESA (Mathematics, Engineering, Science Achievement) Program to provide under-represented middle school and high school students with summer and academic year enrichment activities in geosciences,
- 1.) partner with San José City College and National Hispanic University to enhance student participation in the geosciences by engaging them in active learning experiences and raising their awareness of educational and career opportunities;
- 1.) involve selected high school and college students in research projects,
- 1.) supply year round mentoring and retention activities for students at all levels,
- 1.) offer professional development workshops for middle and high school teachers, and support these teachers' instruction of geosciences with appropriate materials.

In meeting the project goals the investigators conducted a two-week summer institute for geoscience teachers from July 21-August 1, 2003. Additionally, the investigators conducted monthly workshop activities in conjunction with the SJSU M.E.S.A. project and supported M.E.S.A Day Activities. Through the work with the M.E.S.A. project connection the project partnered with other institutes of higher education. Teachers and mentors participating the BAESI South Bay Geo-Diversity Project worked directly with high school students throughout the academic year, thus increasing the sphere of influence of the project.

Overall, this small pilot project was highly successful in increasing geoscience teachers' knowledge of earth and space sciences. Additionally, the project did an excellent job in increasing teachers' confidence in their ability to teach geosciences to a highly diversified student body.

Appendix A
Data Collection Instruments
Pre-workshop Survey

**South Bay Geo-Diversity Project
Pre-workshop Survey**

1. Participant Profile

Biographical Data Tell us a little about yourself:

Name _____

Postal address _____

Email _____

Phone _____

Gender Female Male

Age Group < 20 21-30 31-40 41-50 > 51

Teaching Background

Indicate your background in teaching and learning:

Classroom teacher (Check and/or fill in all that apply):

___ Credentialed ___ Intern ___ Other

Years of experience _____

Subject area taught:

___ Science

___ Mathematics

___ Language arts and/or reading

___ Social studies and/or history

___ Other

Paraprofessional or classroom aid

Tutor or mentor

No teaching experience

Other _____

Personal Knowledge and Teaching Efficacy

1. General Knowledge

I'd rate my personal knowledge of general geology as:

Excellent	Good to very good	Satisfactory	Poor	None
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I'd rate my ability to teach general geology as:

Excellent	Good to very good	Satisfactory	Poor	None
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1. Rocks and Minerals

I'd rate my personal knowledge of rocks and minerals as:

Excellent	Good to very good	Satisfactory	Poor	None
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I'd rate my ability to teach concepts associated with rocks and minerals as:

Excellent	Good to very good	Satisfactory	Poor	None
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1. Fossils and Ancient Life

I'd rate my personal knowledge of fossils and ancient life as:

Excellent	Good to very good	Satisfactory	Poor	None
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I'd rate my ability to teach concepts associated with fossils and ancient life as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

1. Environmental Sciences

I'd rate my personal knowledge of environmental sciences as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with environmental sciences as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

1. Landforms

I'd rate my personal knowledge of landforms and geological processes as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with landforms and geological processes as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

1. Space and Astronomy

I'd rate my personal knowledge of concepts associated with space and astronomy as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with space and astronomy as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

1. Oceans and Marine Studies

I'd rate my personal knowledge of oceans and marine studies as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with oceans and marine studies as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

1. Topographic and Geologic Maps

I'd rate my personal knowledge of topographic and geologic maps as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with oceans and marine studies as:

Excellent	Good to very good	Satisfactory	Poor	None
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Appendix B
Data Collection Instruments
Post-workshop Survey

**South Bay Geo-Diversity Project
Post-Survey**

1. Participant Profile

Biographical Data Tell us a little about yourself:

Name _____

Postal address _____

Email _____

Phone _____

Gender Female Male

Age Group < 20 21-30 31-40 41-50 > 51

Teaching Background Indicate your background in teaching and learning:

Classroom teacher (Check and/or fill in all that apply):

___ Credentialed ___ Intern ___ Other

Years of experience _____

Subject area taught:

___ Science

___ Mathematics

___ Language arts and/or reading

___ Social studies and/or history

___ Other

Paraprofessional or classroom aid

Tutor or mentor

No teaching experience

Other _____

2. Knowledge and/or self-efficacy in Teaching and learning Evaluate your personal knowledge of the topic and then your ability to teach the subject.

a. I'd rate my personal knowledge of general geology as:

Excellent	Good to very good	Satisfactory	Poor	None
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I'd rate my ability to teach general geology as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

a. I'd rate my personal knowledge or rocks and minerals as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with rocks and minerals as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

a. I'd rate my personal knowledge of topographic and geologic maps as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

I'd rate my ability to teach concepts associated with topographic and geologic maps as:

Excellent	Good to very good	Satisfactory	Poor	None
-----------	-------------------	--------------	------	------

1. Student data

Your classroom

Approximately how many students have you taught this year? _____

Approximately how many are from under-represented groups? _____

(African Americans, Hispanics, Native Americans, Pacific Islanders and persons with disabilities)

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At what grade level? _____

What subject(s) are you teaching this year?

b. How many MESA students are you advising? _____

Approximately how many are from under-represented groups? _____

How many hours/week do you meet with MESA students? ____

c. Have you been able to make use of the geoscience concepts and/or activities presented in the summer 2003 South Bay Geo-Diversity workshop in either your classroom or in MESA sessions? ____

If yes, please describe.
