**CLARK COUNTY
SCHOOL DISTRICT**

DOE/NV/11372-T1

SUMMER INSTITUTE FOR MATH AND SCIENCE TEACHERS

**Department of Energy Science and
Technology Education Program**

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**FINAL REPORT
July, 1994**

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Summer Institute for Mathematics
and
Science Teachers
(SIMS)

Final Report

The Summer Institute for Mathematics & Science Teachers (SIMS) was to provide training in strategies and techniques for educating and motivating historically under-represented populations. The Institute featured 40 hours of training over five days, July 13-17, 1993 plus half-day follow-up training November 13, 1993 and April 30, 1994.

The project was founded on recent evidence that made it clear that student interest in pursuing scientific and technical careers was low, which was felt to be a severe impediment in producing adequate numbers of scientists, engineers, and technical professionals to meet future needs. Additional evidence also made it clear that the future work force of the United States would be significantly different from the white, male dominated work force of past years, especially in the scientific and technical fields. To meet national educational goals and to provide a foundation of science and mathematical knowledge and skills for all Americans, science and mathematics teachers must develop new strategies for educating and motivating historically under-represented groups, according to the project. This effort was not only to provide scientific and mathematical

literacy to a broader population, but was to encourage minorities and females to consider scientific and technical careers.

Because studies have shown that many students are forming attitudes about career choices and directions in the sixth, seventh, and eighth grades, this project was aimed at 23 middle school teachers of science and 23 middle school teachers of mathematics. The training was to include sensitization to cultural and gender issues which influence the acquisition of knowledge and skills by the students as well as teacher behavior. The training was to include techniques and strategies of science and mathematics instruction that incorporate the goals of national science and mathematics education reform as established by groups such as the National Science Teachers Association (NSTA) in the Scope, Sequence, and Coordination project, the American Association for the Advancement of Science (AAAS) in Project 2061, and the National Council of Teachers of Mathematics (NCTM). The techniques and strategies were to focus on the relevance of science and mathematics to the students' daily lives through use of pressing environmental issues.

The objective of the project was that participants would utilize a variety of techniques and activities for encouraging historically under-represented groups to consider taking more advanced science and mathematics classes. The evidence for this objective was to be self-reported claims by the 46 teachers that 80 percent of them had used the learned techniques at least five times in their classrooms since the training.

Participants and Training

Math and science teachers from 22 middle schools and one combined junior-senior high school participated in the program. Only five of the district's 27 middle schools did not participate, enabling wide-reaching dissemination of the knowledge and skills gained. According to the project, participants were expected to share their training through formal inservices and informal sharing with other faculty at their site. Table 1 follows on the next page with documentation of the involved schools and the number of teachers from each.

As indicated earlier, the training was expected to focus on the relevance of science and mathematics to the students' daily lives. This was to be accomplished by using environmental issues that are seen as pressing problems in today's society. Presenters for the training were to consist of persons with recognized expertise in the education of under-represented groups and/or recognized expertise in innovative teaching strategies, especially as the strategies related to environmental problems. Presenters were to be school district personnel, university personnel, Department of Energy (DOE) personnel, or non-district personnel from agencies such as the Desert Research Institute and Reynolds Electrical & Engineering Co., Inc.

To illustrate the comprehensiveness of the training and the fulfillment of the intended focus, the topics for the July 12-16 workshop and the speakers are documented in Table 2 on following pages. Table 2 shows the success of meeting the intended focus.

Table 1 Participating Schools	
School	Teachers
Becker Middle School	2
Bridger Middle School	2
Brinley Middle School	2
Burkholder Middle School	2
Cannon Middle School	1
Fremont Middle School	4
Garrett Middle School	2
Garside Middle School	3
Gibson Middle School	2
Greenspun Middle School	1
Guinn Middle School	2
Indian Springs Junior/Senior	1
Johnson Middle School	2
Knudson Middle School	2
Lyon Middle School	2
Martin Middle School	2
O'Callaghan Middle School	4
Orr Middle School	1
Sawyer Middle School	2
Smith Middle School	3
Swainston Middle School	2
Von Tobel Middle School	2
White Middle School	2
TOTAL	48

Table 2
SIMS Training Topics and Presenters

Topic	Presenter
Opening Remarks	NICK AQUILINA U.S. Department of Energy Nevada Operations Office
Workforce 2000	ANN MUELLER Affirmative Action Officer Desert Research Institute
Gender and Cultural Issues	E. LAVONNE LEWIS Human Resources Department Manager Reynolds Electrical & Engineering Co., Inc.
Learning Styles	CONNIE KRATKY Special Student Services Division Clark County School District
NCTM Standards/Project 2061/SSC	RUTH WILSON, GENE BUTLER Curriculum & Instruction Division Clark County School District
Environmental Activities/Math- Science Camp	JHONE EBERT, NANCY KINDER, ROBIN RUBINSTEIN Green Valley High, Dell Robison Middle Schools Clark County School District
Local & National Resources for Encouraging Women & Minorities to Remain in Mathematics and Science	GENE MCGAUGH Director, Minority Engineering Program University of Nevada, Las Vegas
The Future of Science, Mathematics & Technical Education	ERNEST PECK Dean, College of Science & Mathematics University of Nevada, Las Vegas
Tour Desert Research Institute	JOHN GARDNER Desert Research Institute
Tour DOE/EG&G Image Processing Center	ROXANNE E. DEY Public Affairs Office U.S. Department of Energy, Nevada Operations
Technology for the Classroom: CD- ROM Image Processing, Laser Disk Technology, Labquest & Planetary Manager	CATHERINE FLETCHER, ELLEN EBERT, ERIC JOHNSON, MARILYN TREANOR Basic, Chaparral, Eldorado, Green Valley High Clark County School District
Family Math/Family Science, Equals, Reports	JOYCE OLSEN, DIANA PERKINS, DAVID THIEL, SANDRA WARDENBURG Moapa Valley, Las Vegas Academy of Performing Arts, Green Valley High Schools Clark County School District

In addition to the summer training, follow-up sessions were held November 13 and April 30. The November 13 session was from 8 a.m. to 12 noon, focusing on working with ESL students in the middle school, hands-on activities integrating mathematics and science, and brief reports on activities at participating middle schools. Presenters for the November follow-up were:

DON CURRY	Valley High School
JHONE EBERT	Green Valley High School
NANCY KINDER	Green Valley High School
JOHN THOMPSON	Johnson Middle School
JOHN D. WOOD	Valley High School

The April 30 session was from 8:30 a.m. to 11:30 a.m. and focused on altering assessment to accommodate different populations of students. Presenters for the April 30 follow-up session, all from the Far West Labs, were:

ANN MUENCH
DAVE NICKLES
MAYUNI SHINOHARA

Also included in the November follow-up session was the first survey of how many times the teachers had been able to make use of the training. Another follow-up survey asking the same set of questions was sent in March and again in May but with a request to reflect on the entire year. The results of these surveys are reported in the next section.

Evaluation Procedures and Results

The project objective was that the Institute participants would use a variety of techniques and activities included in the training to encourage historically under-represented groups to consider taking more advanced science and mathematics classes. The criterion for the objective was that 80 percent of the participants would report using the techniques learned from the institute at least five times in their classrooms.

In order to determine whether the objective was met, a general evaluation of the training was done at the conclusion of the five-day session and again at the conclusion of the half-day follow-up merely to ascertain whether the participants felt the training was worthwhile at that time. Although the objective states only that follow-up perceptions would be used as a success criterion, the immediate evaluations indicate whether there is much likelihood that the follow-up evaluations will be positive. Additionally, the immediate evaluation results are given the project personnel for their use within one week of the training to enable them to adjust or maintain future training sessions. The evaluation results then include the immediate results of both the summer session of five days and the follow-up session of a half-day plus three follow-up evaluations. Table 3 follows with the results from the two immediate evaluations, including the questions asked of the participants.

Table 3 Results of Immediate Evaluations				
1 = Strongly Disagree 3 = Agree	2 = Disagree 4 = Strongly Agree	July 12-16	Nov 13	Apr 30
1. The purpose of the workshop/in-service was clear.		3.7	3.5	3.7
2. The workshop/in-service was appropriately organized.		3.8	3.6	3.7
3. The objectives of the workshop/in-service were met.		3.6	3.5	3.5
4. The information from the presentation reinforced or enhanced my professional competence.		3.7	3.5	3.8
AGGREGATED		3.7	3.5	3.7

The results of the immediate evaluations are highly positive with aggregated averages of 3.7 and 3.5 out of 4.0 maximum. The training was well received at the time of the training, which suggests that the participants did learn content and skills that they would be able to use. Three follow-up evaluations provided the major evidence for fulfillment of the project objective. The first follow-up was done at the time of the follow-up training, an interval of four months. The second follow-up was done in early March, approximately four months after the follow-up training in November. The final follow-up was done in late May with instructions to reflect on the effect of the training on their teaching after nearly a full school year.¹ The primary question is whether the participants were able to use the

¹ No attempt will be made to determine if any change occurs the following year about classes taken by girls and minority students.

training they had received in their classroom. Question 1 is specific to follow-up usage or application. Additionally, two questions about whether the students at the participant's school benefited from this teacher's training and whether the teacher was able to share the information with other teachers and staff members. Table 4 summarizes the three follow-up evaluations concerning frequency of usage of the training and whether the students benefited because of the training and whether other staff were able to share in the training.

Table 4 Follow-Up Evaluations			
1 = Never 2 = Once 3 = Two to Five 4 = Six to Nine 5 = Ten or More	Nov	Mar	May
1. I incorporated the information/ skills acquired through this training activity in my classroom instruction/ professional duties.	90.9% ≥ 3 3.6	89.3% ≥ 3 3.4	90.6% ≥ 3 3.7
2. Students at my school benefited from my participation in this training activity.	100.0% Yes	100.0% Yes	93.9% Yes
3. I shared information gained and/or materials acquired with appropriate staff at my assigned school/location.	93.2% Yes	100.0% Yes	93.5% Yes

The project objective established a minimum criterion of 80 percent of the participants using the techniques at least five times. This would require a 3, 4, or 5 on the instrument's question 1. Table 4 reveals the percentage of participants choosing 3, 4, or 5 along with an average on the 5-point scale. The specific criterion of the objective has been met even though

the participants' responses became more conservative as the year passed. Nonetheless, a minimum of 80 percent of the participants indicated that they had reported the expected level of usage. The average response for all participants is also reported. The average also (and perhaps more accurately) supports the criterion. The group's average should be greater than 3.0 to ensure at least five applications, and the participants' average over the year was 3.4 to 3.8, well above a minimum of 3.0. THE OBJECTIVE HAS BEEN FULFILLED.

Summary

The Summer Institute for Mathematics and Science Teachers was a successful training project. The participants indicated a high level of satisfaction with the training and they also reported making use of the training at a level greater than the established criterion. Future research will be able to corroborate these findings by actually documenting enrollment figures for girls and minority students.