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## Paper Session III-C - Implementation of a NASA Life Science Teachers Workshop as Part of the Summer Teacher Enhancement Program

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Implementation of a NASA Life Science Teachers Workshop as Part of the Summer Teacher Enhancement Program  
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#### INTRODUCTION

The Summer Teacher Enhancement Program (STEP) was developed to bring up to 40 local area teachers to Kennedy Space Center (KSC) to inform them of activities at KSC and encourage the use of this information in the school curricula. During the second week of the four week STEP, a workshop on NASA-KSC Life Sciences was implemented. The purpose of this effort was to: develop a workshop curriculum and; evaluate the effectiveness of the STEP workshop in informing and educating the participants about NASA Space Life Sciences research and concerns.

Teacher workshops have been used with varying degrees of success. Results of both positive and no effects have been found by various investigators. A bibliography of select research articles on the effectiveness of teacher workshops is included as Appendix I.

#### WORKSHOP DESCRIPTION

The NASA Life Sciences Workshop was a week-long, workshop to inform and teach local educators about the Life Science research activities with which NASA, emphasizing the research that is being conducted at KSC under the NASA Biomedical Operations and Research Office.

A number of life science areas were covered in the workshop: NASA medical operations and microgravity effects on humans; Exobiology; environmental monitoring and research at KSC; Controlled Ecological Life Support Systems (CELSS); plant space biology; and educational programs/technology transfer.

Representative medical doctors and scientists gave informative seminars pertaining to their respective areas which include basic concepts in life sciences as well as career orientation information to pass on to the students of the STEP teachers. The teachers were provided with an information packet which included descriptions of the programs, the KSC Annual Research and Technology Report for 1993, space-exposed tomato seeds, and information on Wisconsin Fast Plants (Williams, Green and Williams 1989) and Bottle Biology activities ( Williams, Greenler, Greenler, Graham, Ingram, Kehle and Eagan 1993).

Classroom activities included: Demonstrations of measurements made on human subjects relative to disorientation and motion sickness; access to computer information over a network; the use of recycled containers in classrooms to build such items as microscopes, aquaria, plant pots and watering systems; and plant biology relating to life support and gravitational biology. The teachers were also taken on field trips to: Environmental monitoring and research sites; the CELSS Breadboard Project laboratories; and the Plant Space Biology laboratory.

The purpose of the workshop was to acquaint the teachers with NASA research, provide information and pertinent teaching activities, generate interest to incorporate pertinent research in curricula and provide contacts for the teachers and students to call upon for information, visits and advice. The workshop was held at the Center for Space Education under the sponsorship of NASA and the University of Central Florida.

#### POPULATION AND SAMPLE

The target population for the workshops are space coast elementary and high school science and mathematics teachers. The 1994 STEP teachers numbered 37 individuals who were from central Florida schools. Their backgrounds included a vice

principal, preschool through high school teachers in teaching math, science, language and other areas. Four of the participants did not fill out the instruments used, so the data reported pertains to only the remaining 33 individuals. The sample consisted of 29 women and 4 men, with a mix of ages and grade levels taught (Table 1).

**Table 1. STEP Workshop Participants Personal Data**

Gender:	(29) female (4) male
Age:	(9) 18-30 years (11) 31-40 years (10) 41-50 years (3) 51-65 years
Grade Level:	(1) don't teach (3) preschool or kindergarten (7) grades 1 through 3 (14) grades 4 through 6 (5) grades 7 through 8 (3) High School
Subject:	(1) don't teach (22) general (3) general science (1) biology (1) physics/chemistry (3) mathematics (1) social science (1) English/language

#### INSTRUMENTATION

To evaluate the effectiveness of this initial workshop, two instruments: a NASA-KSC Biological Research Awareness, Attitude, and Achievement Test (BRAAAT) and the Fast Plants Workshop Participant Evaluation was administered. The BRAAAT was given both as a pretest and a posttest to evaluate the attitude and achievement of the participants. Following the development of the BRAAAT, it was reviewed by management and scientists in the NASA Biomedical Office, but no test for internal or external validity were performed.

In future developments of this test, validity tests will be incorporated.

The right to privacy of the subjects was protected by the assignment of code numbers within their packets which were not known to the implementer. These codes were used by the subject when filling out the instrument.

The Fast Plants Participant Evaluation is another attitude instrument that was administered during the workshop. It has been widely used to in evaluating other Fast Plants workshops.

Because a convenience sample was used and a small sample size evaluated, only descriptive statistics were calculated (Dreschel 1994).

## RESULTS AND DISCUSSION

### Attitude Evaluation

There was no change in attitude toward NASA programs observed from this workshop. This can be attributed to the fact that all favored NASA programs and have a vested interest in these programs as they work in the Space Coast area and/or were relatives of KSC employees. According to the results from the Fast Plants Workshop Participant Evaluation, there was a significant increase in understanding (4.1 on a scale of 1 to 5), interest in learning (4.39 on a scale of 1 to 5) and teaching about plants (4.3 on a scale of 1 to 5).

### Evaluation of Achievement

In the area of environmental monitoring and research, all of the questions indicate some level of improvement in knowledge of pollution topics and endangered species from pretest to posttest. Generally, if the topic was discussed to some degree during the field trips, where the participants could relate what they heard to what they were seeing, the information was retained.

Some improvement was seen in biological aptitude relative to the Controlled Ecological Life Support Systems topics which related closely to particular subjects discussed on the tour. For example, the discussions of hydroponics during the tour of plant experiments lead to a dramatic improvement (17 correct on the pretest question, 32 correct on the posttest question) in the understanding of the basic requirements for plant growth.

Under the subject of Plant Space Biology, there was even a negative achievement in the understanding of photosynthesis (22 correct on the pretest question, 17 correct on the posttest question), but were improvements in all the other areas tested. For example, in the area of geotropism, 19 responded correctly on the pretest question, 32 correctly on the posttest question and for phototropism, 18 correct responses to the pretest question, 33 to the posttest question. A number of comments made during the workshop were that some of the speakers were too technical in their presentations which may have lead to some confusion over the process of photosynthesis. The other areas, in which the participants may have had no prior knowledge, were emphasized during the talks and tours. This may have resulted in better retention of these concepts.

#### Observations and Teacher Comments

The participants showed a great deal of enthusiasm, particularly when working with hands-on activities in the classroom. They also had very positive comments on the research being performed in life sciences at KSC from the tours they participated in. There were many requests for classroom aids from the speakers (slides and overheads) and there have been subsequent requests for the lecturers to visit classrooms. We have also received notes of thanks from a number of the participant teachers.

#### CONCLUSIONS AND RECOMMENDATIONS

Generally, comments on the workshop from the participants were very favorable. The most common negative comments were: The speakers presentations were to long and technical and; too much time was spent sitting. The most common positive comments were: Having the tours follow the appropriate speaker helped in understanding purpose; the hands-on activities were fun and quite appropriate to their teaching; they could now tie most of their subjects to space science and; they had learned of many NASA program for which they had no prior knowledge.

Breaking the workshop into two or three shorter workshops covering the same subjects might improve understanding and promote more discussions. Also, fewer participants in each would increase the potential for personal interaction (questions, discussions, demonstrations).

#### REFERENCES

Dreschel, T. W. (1994). Implementation and evaluation of the NASA Life Sciences Summer Teacher Enhancement Program. Report to the NASA Biomedical Operations and Research Office, J. F. Kennedy Space Center, FL.

Williams, P. H., Green, R. P. & Williams, C. M. (1989). Exploring with Wisconsin Fast Plants. elementary/middle school manual. Madison, WI: The Wisconsin Alumni Research Foundation.

Williams, P. H., Greenler, J., Greenler, R., Graham, L., Ingram, M., Kehle, L. & Eagan, D. (1993). Bottle biology, an idea book for exploring the world through soda bottles and other recyclable materials. Dubuque, IA: Kendall/Hunt Publishing Company.

APPENDIX I  
BIBLIOGRAPHY

- Clermont, C. P., Krajcik, J. S. & Borko, H. (1993). The influence of an intensive in-service workshop on pedagogical content knowledge growth among novice chemical demonstrators. Journal of Research in Science Teaching, 30(1), 21-43.
- Gabel, D. & Rubba, P. (1979). Attitude changes of elementary teachers according to the curriculum studied during workshop participation and their role as model science teachers. Journal of Research in Science Teaching, 16(1), 19-24.
- Glass, L. W. (1981). Outcomes of an energy education workshop for secondary school science teachers. School Science and Mathematics, 81(6), 496-502.
- Hendren, J., Mertens, T. R. & Nisbet, J. J. (1973). A study of an NSF institute. The American Biology Teacher, 35(9), 510-514.
- Lawrenz, F. P. (1984). An evaluation of the effect of two different lengths of inservice training on teacher attitudes. Journal of Research in Science Teaching, 21(5), 497-506.
- Mayer, V. J. & Fortner, R. W. (1987). Relative effectiveness of four modes of dissemination of curriculum materials. Journal of Environmental Education, 19(1), 25-30.



- Sheldon, D. S. (1978). Long-term impact of curriculum awareness conferences on school administrators and key teachers. Science Education, 62(4), 517-521.
- Smith, L. T. & Haley, J. M. (1981). Inservice education: Teacher response and student achievement. School Science and Mathematics, 81(3), 189-194.
- Vandegrift, V. & Crafton, A. (1990). The influence of two recent NSF summer workshops on high school chemistry and physical science teachers. Journal of Chemical Education, 67(12), 1047-1052.