AN EVALUATION OF ADULT EDUCATION ACTIVITIES OF THE SPACE SCIENCE EDUCATION PROJECT IN A TOTAL COMMUNITY AWARENESS PROGRAM

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PREFACE

The concern of this study is an attempt to evaluate the efforts of the Space Science Education Project's activities in the adult portion of the Total Community Awareness Programs. The primary objective is to determine if there is a significant difference in the knowledge of, and understanding and awareness for, space activities and their impact on society in adults after they have witnessed a presentation by a space science education specialist.

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CHAPTER I

INTRODUCTION

Background of the Study

The National Aeronautics and Space Administration (NASA) has been actively involved in educational services since the creation of NASA by the National Aeronautics and Space Act of 1958.[1] These services are organized, coordinated, and promoted through the Educational Programs Division of the Office of Public Affairs, NASA Headquarters, Washington, D. C.

The efforts of the NASA educational services fall into the following categories: 1. Assistance to schools, colleges, and universities in the structuring of space science education through seminars, symposiums, and institutes. 2. Initiation and development of space education materials for use by teachers and adult educators. 3. The NASA Awards Program for outstanding high school student scientists. 4. Assistance in state science education programs in cooperation with State Departments of Public Instruction. 5. Working closely with different organizations and agencies, such as the U. S. Office of Education, the National Science Foundation, and the National Academy of Sciences, to implement national and international space education programs. 6. Providing a consultation service to public schools, colleges, and universities, to assist them in making maximum use of personnel and resources available for developing space science programs. 7. Providing

the funds for the Space Science Education Project (SSEP), a program directed by Oklahoma State University, a NASA contractor. This program includes traveling space science demonstration units, called Space-mobiles, which are used to carry lecturers and equipment to various assignments.[2]

In addition to the approximately one-hour lecture and demonstration program provided for elementary and secondary school audiences, the SSEP is involved in other educational services. Among these services are the Total Community Awareness Programs. Although these programs may vary slightly among the different cities in which they are presented, all of the programs follow a similar pattern.

The basic objective of a Total Community Awareness Program is to reach as many different interest groups as possible in a metropolitan area, in order that the members of these groups may become more knowledgeable of, and develop a better understanding and awareness for, space activities and their impact on society.

A typical Total Community Awareness Program may last as long as three weeks and require the efforts of eight or ten full-time lecturers. These lecturers, called space science education specialists, present programs to the various interest groups and schools within the community. In addition, there are usually space-related displays exhibited in public places such as malls of shopping centers.

As stated above, a variety of audiences are exposed to the expertise of the space science education specialists. These audiences include school age children, service clubs, parent-teacher groups, young people groups such as 4-H, Y.M.C.A., C.Y.O., and others, professional

and business organizations, labor groups, in-service teacher training groups, and church-sponsored or related groups.

The adult education portion of a Total Community Awareness Program consists of presenting programs to adult groups. Included in these groups would be service clubs, business clubs, social clubs, senior citizen clubs, and professional organizations. The programs are usually a narrated slide presentation complemented with a display of models. Most presentations are made in conjunction with a combined meal-business meeting and, typically, are the program for that particular meeting.

Statement of the Problem

Oklahoma State University has had the national NASA contract for the SSEP since 1969. During this time there have been approximately twelve to fifteen Total Community Awareness Programs conducted each year. Previous to this study there has been no attempt to evaluate the SSEP's efforts in the adult portion of the Total Community Awareness Programs. Consequently no information was available which indicated whether the efforts in this area have satisfied their intended purposes.

Statement of the Purpose of the Study

The purpose of this study is to evaluate the effectiveness of certain aspects of the SSEP's efforts in the dissemination of knowledge about NASA's space activities to adults.

The Need for the Study

One of the provisions of the Act of Congress which created NASA in 1958 was that any new knowledge discovered by NASA or any of NASA's contractors was to be disseminated to the public. Part of that responsibility is delegated to the SSEP at Oklahoma State University through the NASA Office of Public Affairs. If this obligation is to be satisfied, it becomes imperative that the SSEP evaluate its efforts in these areas.

Therefore the SSEP must evaluate: 1. For the purpose of improvement in organizational operation, including such aspects as its planning process, structure, personnel, physical facilities, training, and public relations; and 2. For the improvement of its program, including such aspects as objectives, clientele, methods and techniques, materials, and quality of learning.[3]

The Scope of the Study

It was not the intent of this study to evaluate in all of the aforementioned areas. Primarily this study was concerned with the quality of learning achieved in a very select population. This population was comprised of the members of some of the adult interest groups in and around the Tulsa, Oklahoma, area. The results of the study cannot be generalized to other areas of the country because the sample of the study may not be representative of the nation's total adult population, nor did the treatment extend to all adults in the United States. However, there may be inferences from this study which would warrant further investigation.

Definition of Terms

NASA Educational Programs Division. The branch of the NASA Public Affairs Office concerning itself mainly with providing service to students, educators, and educational institutions.[4]

NASA Office of Public Affairs. A division of NASA which is responsible for carrying out the congressional mandate that the public receive "the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."[5]

Adult Education. Activities which enhance and promote learning in people no longer attending school on a regular, full-time basis.

NASA Contractor. An institution or business concern which contracts with NASA to provide certain services and/or skills or to produce certain goods.

Spacemobile. A mobile van equipped with demonstration equipment and materials operated by a space science education lecturer who puts on programs for schools and different interest groups.

Interest Group. A set of people who meet frequently or occasionally to learn or share ideas about some common interest or to promote some common goal.

Pre-Program Instrument. The instrument used to gather information about the knowledge, understanding, and awareness that members of an interest group possess about space activities and their impact on society prior to witnessing a program which is part of a Total Community Awareness Program.

Post-Program Instrument. The instrument used to gather information about the knowledge, understanding, and awareness that members of an interest group possess about space activities and their impact on society after witnessing a program which is part of a Total Community Awareness Program. The pre-program instrument and the post-program instrument are alike.

FOOTNOTES

[1]James V. Bernado, "NASA's Educational Programs" (Washington, D. C., September, 1964), p. 8.

[2]Ibid., p. 9.

[3]Malcolm Knowles, The Modern Practice of Adult Education (New York, 1973), p. 223.

[4]Robert Dale Helton, "A Study of Aerospace Education Workshops Which Utilize NASA Materials and Resource Personnel" (unpub. Ed.D. dissertation, Oklahoma State University, 1973), p. 7.

[5]Ibid.

CHAPTER II

SELECTIVE REVIEW OF LITERATURE

Introduction

The literature reviewed in this chapter is that which the author felt was closely related to the problem. The first part is a brief review of the historical development of adult education in the United States and the implications implied for the future programs. This part is followed by a brief summary of the nature and extent of the Federal Government's activities in adult education. Included in this summary is a list of characteristics of present Federal activity. The concluding part of the Review of the Literature contains the recommendations of several authorities in program evaluation. These recommendations include suggestions on methods, techniques, and criteria for effective program evaluation.

Historical Development of Adult Education

The following list of events and landmarks trace the development and importance of adult education in the history of this country. This list is not intended to be comprehensive or complete, but rather to give an idea of the extent and variety of ways that adult education was fostered and grew as the country was developing.

1. The Town Meeting. Although the primary purpose of the colonial town meeting was to give the early settlers an opportunity to become

informed and to discuss important issues, it was the first civics affairs discussion group in this country.

2. The Junto. (1730) An informal discussion group, organized by Benjamin Franklin, "conducted in the sincere spirit of inquiry after truth." In a modified and expanded form it continued as an active informal education center in Philadelphia until the late 1950's.

3. Libraries. (1735) The nation's first library was a direct outgrowth of the Junto.

4. The Lyceums. (1826) Started by Josiah Holbrook with the purposes of mutual improvement of its members through study and association, to disseminate knowledge by establishing libraries and museums, and to stimulate support for tax-supported public schools.

5. Mechanics Institutes. (1831) Spread to a large number of cities during the nineteenth century. The early programs consisted of lectures on architecture, political economy, botany, geology, natural history, and astronomy. They served as important educational resources for workers in the country.

6. The Chautauqua Movement. (1874) Started by the Methodist-Episcopal Church as a residential adult education activity at Fair Point Camp in New York. Although it had a religious emphasis at the beginning, it became a literal education program. The original movement played a significant part in influencing such future leaders of university adult education as William Rainy Harper and C. R. Van Hise.

7. Higher Education. (1880) The Universities of Wisconsin, Minnesota, California, and several others claim credit for launching the first program of continuing education and extension. Under the leadership of C. R. Van Hise at the University of Wisconsin, the state universities moved actively into the field of adult education in the 1880's. As broadly envisioned by Van Hise, extension included correspondence teaching, lecture services, summer school, extension classes, press and publication services, films and visual-aid services, and conferences, institutes, and short courses.

8. Agricultural Extension. (1887) Formal agricultural extension services grew out of the Land-Grant Colleges created by the George - Morrill Act of 1882 and the Agricultural Experimental Stations provided by the Hatch Act of 1887. Seymour Knapp was responsible for translating the scientific development of the Experimental Stations to the farmers of the country by demonstrations.

9. Vocational Education. (1917) The Smith - Hughes Act of 1917 provided for Federal support of vocational education. The private mechanical and polytechnical institutes flourished during the latter part of the nineteenth century, but not until 1906 did the states get into the act of providing money for vocational education.

10. More Recent Landmarks. The development of worker and labor education started in the 1920's. The adult and worker education program of the W.P.A. existed during the depression years. During World War II new methods and techniques of vocational, occupational, and professional

education developed. Since World War II there has been a mushrooming reawakening of interest in university, public school, and voluntary association adult education.[1]

Liveright highlights several significant factors characterizing the growth of adult education in America.[2]

1. Adult education has always been a basic part of American life.

2. Significant advances, innovations, and developments in adult education appear to be the combined product of social need and a creative individual.

3. Until recently, Federal involvement in adult education has followed private innovations and demonstrations.

4. Federal involvement in adult education has been almost entirely vocational and agricultural until relatively recent years, whereas voluntary associations have been concerned primarily with civic and liberal education.

5. Although some twenty-five million adults now participate in adult education, involvement was probably proportionately greater during the final decade of the 19th century and first decade of the present century. The reason being the need for basic adult education at that time.

In a major study undertaken by John Johnstone and Romon Rivera for the National Opinion Research Center (financed by a grant from the Carnegie Corporation) during 1962 and 1963, a comprehensive and factual picture of the extent and nature of participation in adult education in the United States existed for the first time. Although the study is

more than ten years old, there were some significant findings that emerged about participation in adult education. Liveright interprets these findings into the following implications for future action:[3]

1. About one out of every five adults is involved in some kind of adult education activity, and the proportion will probably increase. Therefore a shortage of trained adult educators is eminent.

2. Despite generally high participation in adult education, low socio-economic groups are grossly under-represented. The need for special research, experimental programs, and funds to involve those who can benefit most from education for vocational, family, personal, social, and civic competence is readily apparent.

3. Adult education is no longer primarily related to rehabilitation and remedial goals. It is used more in a kind of continuing role in the sense of transferring systematic learning processes to the interests and demands of adult life. Therefore it must move from traditional subject matter to programs for creating a more satisfactory adult life style.

4. Education for social and civic competence is inadequate. The need for more informed electorate demands educational activity for adults in this area.

5. Adult education related to ideas and values is also neglected. Greater emphasis is required in the neglected areas of value judgements and examination of ideas.

6. There is considerable less emphasis on "credit" in adult education than was anticipated. Therefore the quality and relevance

of adult education activity must be stressed.

7. Many more adults than anticipated are involved in independent study. Considerable research and experimentation are needed in order to maximize benefits in this area.

8. Adult enrollment is shifting from vocational courses to recreation and hobby-related programs. Voluntary association and organization along with established educational institutions must be prepared to meet the changing demands.

9. Recruitment for adult education must be more directly responsive to the interests and motivation of specific sex and socio-economic groups.

10. More effective educational counseling and tutorial services are needed so that schools and colleges may direct their graduates toward continuing education.

11. Adult education should seek to develop cooperative programs with employers because adult education participation begins in job-connected context.

12. More visible and accessible information facilities and central referral services are required, particularly for lower socio-economic groups.

Federal Involvement in Adult Education

There is no single Federal office where it is possible to obtain data and statistics on the Federal Government's involvement in adult education. There have been several studies in this area by independent organizations. One study was the result of an invitation by the United States Commissioner of Education to A. A. Liveright. This study was

undertaken by the Center for the Study of Liberal Education for Adults at Boston University.[4] The study was conducted during 1965 and 1966 and the results published in a book copyrighted in 1968 entitled Study of Adult Education in the United States.

The Adult Education Association of the United States of America is responsible for preparing a directory of programs and services in the area of adult education. The first edition of this publication, Federal Support for Adult Education, was published in 1966 and a revised edition in 1969.[5]

Since no central agency for adult and continuing education exists in the Federal Government, it is natural to look to the United States Office of Education for guidance and assistance. Located in this office are several bureaus that administer programs that are relevant to adult education. One of these is the Bureau of Adult, Vocational, and Library Programs. Another, for example, is the Bureau of Education Professions Development.

In the study conducted by Liveright, the data secured covered 65 different programs in 21 departments, bureaus, and agencies.[6] Of these 65 programs, budget information was available on 44 of them. This information revealed that almost $1.6 billion was budgeted for the fiscal year 1965. Participation in the 53 programs for which data regarding participation was obtained totaled slightly more than 27 million people.

Listed below are the departments or agency administering the different programs, the funds allocated, and the number of participants:[7]

Health, Education & Welfare	$601.0 million	4,442,147
Office of Economic Opportunity	369.8 million	288,667
Labor	291.8 million	381,168
Agriculture	67.1 million	16,079,392
National Science Foundation	53.5 million	50,891
Civil Service Commission	34.5 million	15,208
Defense	20.5 million	5,605,491
Interior	11.8 million	71,805
Commerce	10.0 million	-
Atomic Energy Commission	9.2 million	3,614
Small Business Administration	-	37,378
Justice	1.7 million	34,828

Categorizing the nature of the adult education activities, the programs fell into four areas. Education for vocational and occupational competence was the objective of 44 Federal adult education programs in Liveright's study.[8] But there is an interest trend in areas beyond vocational competence. This is borne out by the fact that there were ten programs in the category of education for self-realization and one program each for personal and family competence and civic and social competence.

By 1969 the special missions and contributions of adult or continuing education were winning increased recognition and support. In the study published by the Adult Education Association of the United States of America, over 100 programs in adult education were being financially supported by Federal departments, agencies, and bureaus.[9] The Department of Health, Education, and Welfare led the list with 47 programs.

In all, nine departments were lending support to adult and continuing education. Also included in this list were the Departments of Housing and Urban Development, Interior, Labor, State, Transportation, Post Office, and Defense.

In addition, there were 10 independent agencies in the Executive Branch also financially supporting adult and continuing education. Among these was the National Aeronautics and Space Administration.

The policy of the Federal Government toward adult education differs in many respects from the policy at other levels of education. Liveright points out four distinct differences in Federal policy:

> 1. Elementary and secondary schools and colleges and universities have been developed and controlled chiefly by private interests and by the States. Federal interest in adult education was firmly established more than fifty years ago with passage of the Smith-Lever Act. Many of the strongest adult education programs were created by the Federal Government. New Federal interest in adult education does not represent a fundamental change. Federal involvement in childhood and youth education represents a break with past traditions.
>
> 2. Childhood and youth education is concerned with relatively few but very large forms of organization (elementary and secondary schools, colleges, and universities). Adult education is concerned with a seemingly endless variety of institutions (libraries, museums, settlement houses, unions, agriculture, private industry, etc.), none of which dominate the scene.
>
> 3. New institutional forms in childhood-youth education, such as those included in Titles III and IV of the Elementary and Secondary School Act of 1965, are looked upon as bold innovations. New forms are commonplace in adult education.
>
> 4. Educational activities for youth are largely concentrated in the U. S. Office of Education and a few other Federal departments. Adult education's outreach has been so great that every Federal department is involved and each has developed its own policies and approach.[10]

There appear to be four Federal adult education policies that endure:

1. An adult education program is ordinarily undertaken as a means to achieve a specific objective or mission. Almost all adult education legislation and appropriations have been tied to specific social purposes or programs. As a result, adult education has been looked upon as a means of implementing particular missions of specific agencies.

2. Three major approaches for the support of adult education are used by the Federal Government: grants-in-aid, contracts for service, and direct operations.

3. Continuing and special grants for adult education are used to stimulate public and private agencies to undertake favored services. As has been pointed out by James Conant, the Federal Government has been involved in a policy of "continuing bribery," in an effort to influence educational policy and programs. This is sound policy since representatives of private and public education agencies are active in shaping the policies and programs finally adopted by the Federal Government.

4. The Federal Government has a special responsibility to equalize educational opportunity. One of the strongest arguments for adult education has always been that it gives a new chance to persons who were unable to take advantage of education in youth.[11]

Added to the list of Federal policies are seven in the process of change:

1. Previous Federal policy has held that adult education should advance economic progress. Emergent policy holds that adult education should achieve many different purposes. Adult education has been defended chiefly on the grounds that it raises living standards. Most Federal financed programs have been concerned with vocational and agricultural education, and with basic literacy. The Library Service Act of 1965 represents a major turning point toward a broader concept of adult education.

2. Government policy has held that Federal funds should be used to extend prototype institutions and programs. Emerging policy holds that funds may be used to create new educational forms and activities.

3. It has been accepted policy that the Federal Government has no responsibility for coordination of its adult education efforts. There is an increasing belief that a pattern of coordination should be developed.

4. Federal policy has put major emphasis upon Office of Education programs related to childhood and youth and placed little emphasis upon adult education. Emerging policy suggests that the U. S. Office of Education should both sponsor adult education and coordinate Federal services and activities in the field.

5. In the past, Federal policy has called for work with and through only a few institutions in its "grants-in-aid" program. Emerging policy indicates that the Federal Government now will work with and through a variety of agencies.

6. Since the Federal Government worked through the "chosen instrument" policy in the past, there was little need to coordinate adult education at the state and local level. Emerging policy, resulting from the involvement of a number of agencies and organizations, calls upon the Federal Government to assume responsibility in assuring that its grants do not create imbalance and disharmony in the States.

7. Past general policy called upon the Federal Government to establish broad policies and fiscal controls in grant-in-aid programs and then permit considerable freedom to State agencies. Currently developing policy provides for greater Federal responsibility and control over programs it initiates or finances. This tendency is seen in the specific requirements of new legislation and in the fact that annual or periodic enactments are replacing general bills such as those that often governed earlier programs.[12]

In summarizing, Liveright points out that the expansive adult education program touches almost every department and agency in the Federal Government.[13] Lacking in coordination, the Federal adult education programs appear to adhere to no basic philosophy or follow no master plan or set of objectives. The Federal Government is assuming a greater role in adult education leadership by funding at higher levels, more and different kinds of programs. Federal activity in adult education includes grants to educational institutions and private industry and has gone beyond vocational and occupational training into such areas as family and personal development, consumer education, and civic involvement.

Evaluation

Liveright believes every person must be offered an opportunity to develop fully his skills and unique capabilities as an individual, family member, worker, and member of society in order to preserve and strengthen the free society of which he is a member.[14] The question then becomes: "Who is responsible for making available on a lifelong, continuing basis the educational opportunities, activities, and programs needed to guarantee this personal growth and self-realization?" We look to all levels of government to provide the opportunities.

If government provides the opportunities mentioned in the preceding paragraph through varied programs, how well are the programs succeeding in helping people to learn what was originally intended? Trant maintains that adult students need to know the extent to which they are getting the kind of education they want and need.[15] Adult students ask the question: "To what extent am I accomplishing my purpose?"

Miller believes that, in order to answer questions such as these, we need to be interested in program evaluation and not student evaluation.[16] He endorses the notion that the important issue is not--is the student doing well enough or as well as his fellow students--but, rather how well is the program succeeding in helping people to learn what was originally intended they should learn.

In a paper presented by Steele and Moss, they define evaluation as the systematic judging of the worth, desirability, effectiveness, and adequacy of something according to definite purpose of criteria.[17] The judgement is based upon a careful comparison of observed information and data with established criteria. The critical items in a valid evaluation are clear definition of what is to be evaluated, precisely stated

purposes, specific standards for comparison criteria, accurate observations and measurements, and logical conclusions.

Liveright believes that basic evaluation involves knowing where a person wants to go, where he is now, and where he was at some other time.[18] Comparing the past position with the present one in relation to the sought position enables him to judge his progress. But evaluation must also be concerned with the programmer, the administration, the present and future needs of the participants, and local, state, and national power structures.

Luke cautions that evaluation, like anything else, can be run into the ground.[19] He says: "As ridiculous as the situation in which no evaluation is done is the one in which pulse-taking becomes a preoccupation."

Concurring with Luke, Lenzer answers the question, "Why evaluate?" by saying: "Besides other reasons, it's fashionable; education is as responsive to irrational motives as other major social institutions, if not more so."[20]

Examining the program planning process is a possible approach to program improvement during evaluation. Seven useful steps in program planning place emphasis upon:

1. Creating a climate that is inducive to learning. This would include ensuring physical comfort, generating emotional security, and securing the participant's acceptance of the responsibility for learning.

2. Establishing the machinery for program planning. One of the biggest pitfalls a program planner must avoid is trying to do it all himself. He or she must involve the people with whom they are working

in helping to plan the activity.

3. Identifying the needs and interests of the individual who has his own unique needs, of organizations that need to increase the level of performance or competence of individuals in various operations, and of the geographic area.

4. Establishing goals and objectives of the educational program.

5. Designing the program within the given set of constraints. Included within these constraints are the methods, techniques, and materials available.

6. Administering and directing the operation of the program.

7. Evaluating the success of the program in light of the needs and objectives to be satisfied and providing for the re-planning process.[21]

There are several ways that an understanding of the program rationale benefits program evaluation. These are:

1. By identifying the parts of the program that are of special importance. This gives points that can be focused upon by the evaluation team.

2. By assuring those associated with the program that the evaluation process will take their viewpoints and expectations into account.

3. By providing a basis to encourage people to use evaluation findings.

4. By providing a basis to select relevant standards of excellence.[22]

Program evaluation may consist of six related activities:

1. Decide on where the program evaluation emphasis must be placed that is most appropriate for the specific situation. Select the evaluation models that are most useful. Choose the context within which the program evaluation will occur.

2. Describe the intended and achieved outcomes of the educational program, such as the level of participant's achievement in the program or subsequent application of the knowledge learned.

3. Describe the intended and achieved inputs into the educational program, such as the characteristics of the participants and their previous training, the teachers and their student's expectations, and any teaching materials that may be used.

4. Describe the intended and achieved processes and transactions that bring together inputs to produce outcomes, especially the teaching-learning transactions.

5. Make judgements by comparing what was intended with what was achieved, by comparing the costs with the benefits, and by comparing the resultant conclusions with accepted external standards.

6. Make application of the evaluation by using the results of the evaluation to improve the educational program.[23]

The evaluation effort should be centered where the most improvements for the evaluation dollar can be realized. The major elements in evaluation are criteria, evidence, and judgement. The criteria forms the necessary framework in which the evidence is collected in order that sound, unbiased judgements may be made.[24] The quality of the evaluation project will depend on the quality of the criteria used. Selection of quality criteria is a necessary condition for effective evaluation, for

without sound criteria evaluation is an experience in futility. On the other hand, quality criteria is not a sufficient condition for effective evaluation; i.e., having chosen the proper criteria does not guarantee an effective evaluation process. The selection of criteria then becomes a major problem for the evaluation team.

The selection of criteria categories should be done in terms of the characteristics of the program. These characteristics include effectiveness, efficiency, effort, number of contacts with the people, quality, suitability, and importance.[25] There are several different sources from which criteria for evaluation may be drawn. An excellent choice is from the accepted principles of the era. Criteria may also be drawn from theory. Other studies, of which some could be related to the one on hand, can furnish a source of criteria. A source which is most familiar is the evaluator's own experience. Criteria selection may also depend upon the evaluator's own philosophy. A fundamental point to be recognized and accepted is the fact that the selection and the development of the criteria statements is ultimately a matter involving value judgements. Hence criteria rests upon the arbitrary judgement of the evaluator.[26]

Seven premises for the useful tools of criteria in evaluation are:

1. The goal of evaluation is the use of program judgements in the program decision making process. The evaluation and the criteria used must have the confidence of those making relevant decisions.

2. Evaluation is not complete unless judgement occurs. Judgements are dependent upon criteria.

3. An important part of the process of doing evaluation is determining the type of criteria that is relevant. The kinds of decisions

to be made should govern the type of criteria selected.

4. Criteria have both a conceptual and a performance component. The conceptual component is a verbal statement of the importance of certain outcomes or qualities. The performance component is any observable event which is judged to be relevant to the conceptual component.

5. The rational approach is centered in systematic observation and logical analysis of the criteria behavior leading to a designation of the base components to be employed in making comparisons. The rational approach to criteria formation is the most relevant in the typical program evaluation situation.

6. The effectiveness of the evaluation rests primarily with the quality of the criteria used.

7. The effectiveness and efficiency in evaluation is determined, to a great extent, by the competency of the evaluator in developing criteria that are crucial and critical to his evaluation purpose.[27]

Even though some evaluators may have the best intentions, their efforts fall short because of a lack of understanding and insufficient knowledge in the use of criteria for evaluating programs. Several contributing factors for this situation can be identified. They are:

1. The evaluator has too narrow of a concept of evaluation. Inadequacies would include an insufficient definition of evaluation, knowledge of evaluation theory, of criteria formulation, of approaches for different levels of evaluating, of mechanism for organizing, processing, and reporting evaluation information, and insufficient sources of trained personnel.

2. Administrators are more interested in elaborate descriptions of their results than they are in systematically-derived judgements to be used internally.

3. The lack of a framework for guiding criteria development and interpretation.

4. Some evaluators have too great an emphasis on information and pay too little attention to interpreting that information.

5. The desire to avoid decision making.

6. Because people as a whole and evaluators in particular are too objective minded, they wish to avoid challenge by avoiding subjectivity.

7. Adult educators fail to trust what they know about adult education programming.[28]

The evaluation process should be a continuous process involving the participants, teachers, and administrators. Evaluation can be divided into two categories. One is the process of determining the value of learning experiences in achieving the specific objectives sought. This is known as product evaluation. The other is to judge the process of establishing objectives and selecting appropriate techniques, learning experiences, and resources. The focus here is on the "how" and "why" of the instruction. This process evaluation, as it is known, provides information on how well the various components of instruction are contributing to the process of learning.[29] It compares the plans with what actually occurs and serves as the basis for more effective planning.

The evaluation process consists of four simple and basic steps:

1. Establishing the criteria or yardsticks, i.e., formulating the questions you want answered.

2. Collecting the data that will provide you with the information needed for answering those questions.

3. Analyzing the data and interpreting what it means as answers to the questions raised.

4. Going back to the drawing board and modifying the program, plans, and operation with respect to the findings.[30]

The inputs of a program include the participants, teachers, counselors, aids, supervisors, administrators, support staff, equipment, facilities, learning materials, established goals, requirements, and money. Evaluation of the inputs can show deficiencies and indicate which changes related to these inputs are likely to produce the greatest program improvements. Input evaluation determines the extent the inputs measure up to the expectations.

A careful observation in an ordinary life situation would give direct evidence for an accurate measurement or evaluation. The basic problem in instrument development for any education evaluation is to find the most convenient and economical test to which the participant's response would bear a close relationship to the behavior which could be expected from an individual in a non-test situation.[31]

Considerations in instrument design should include the facts:

1. That evaluation is the systematic process of collecting and applying information in decision making.

2. That evaluation, to be maximal, should incorporate the inputs of the groups necessarily involved in the decision making process.

3. That a common instrument that can be used by persons with different roles and position is the most practicable means of achieving this involvement.[32]

Adult education programs are difficult to evaluate because of the nature of education at that level. The difficulties arise because of the considerable variation in the amount of change which the various types of adult education programs expect to achieve. Another contributing factor is the enormous range of specific content involved in the variety of programs. The very fact that adult participants do not like being tested, because testing is for many people a threatening situation which arouses defense reactions, also makes adult programs difficult to evaluate.[33]

There are some quick evaluation techniques that can be used to evaluate adult programs. It is imperative with adults to emphasize that the program is being evaluated and not the participants. Nevertheless these techniques are:

1. An end-of-the-meeting reaction form on which the participants have the opportunity to express their opinions of that particular meeting.

2. Interviewing selected persons from the target audience.

3. A before-and-after test structured to determine changes in the levels of understanding of the issues and judgements of values involved.

4. Using a program evaluation committee of which some of its members were not on the program development team.[34]

Program evaluation contains two types of comparisons. The one is internal comparison in which you compare intended inputs and achieved inputs, intended processes with achieved processes, intended outcomes with achieved outcomes, and expected results with achieved results. These comparisons give a basis for judgement about effectiveness.

The other comparison is external comparison in which the product can be compared or measured against some accepted standard.[35]

The major categories of outcomes that have been included in evaluation studies are:

1. The general impact of the program with the progress of the participants, adequacy of the program, and the proportion of the participants who persisted to completion.

2. Participant satisfaction.

3. Content or subject mastery.

4. Personality changes including an improved self-image and a greater social awareness.

5. Work-related success reflected by higher income, promotions, job satisfaction, etc.

6. Performance in adult-life roles.

7. Benefits to school systems.[36]

The evaluation effort of an educational program should result in studying alternate teaching procedures in terms of their relative effectiveness in helping participants achieve the stated objectives,

suggesting changes in the teaching procedures to practices that might be more effective than those currently in use, and reassessing the reality level of the objectives themselves, and perhaps revising them in light of this total process.[37]

FOOTNOTES

[1]A. A. Liveright, A Study of Adult Education in the U. S. (Boston, 1968), pp. 19-22.

[2]Ibid., pp. 22-23.

[3]Ibid., p. 28.

[4]Ibid., Preface.

[5]Adult Education Association of the U. S. A., Federal Support for Adult Education (Toronto, 1969), Foreword.

[6]Liveright, p. 49.

[7]Ibid., p. 50.

[8]Ibid.

[9]Adult Education Association of the U. S. A., p. 10.

[10]Liveright, pp. 41-42.

[11]Ibid., pp. 42-43.

[12]Ibid.

[13]Ibid., pp. 52-53.

[14]Ibid., p. 5.

[15]David Trant, Evaluation of Adult Education (Washington, D. C., 1970), p. 4.

[16]Harry L. Miller, Evaluating Liberal Adult Education (Chicago, 1961), p. 4.

[17]Sara M. Steele and Gwinna M. Moss, "The Criteria Problem in Program Evaluation" (presented at the Adult Education Research Conference, Minneapolis, February 27, 1970), p. 1.

[18]Liveright, p. 5.

[19]Robert Luke, How to Train Teachers to Train Adults (Englewood Cliffs, New Jersey, 1971), p. 42.

[20]Antony Lenzer, "Course Evaluation, More Necessary Than Evil," Adult Leadership, XVIII (November, 1969), p. 139.

[21]Eugene I. Johnson and Curtis Ulmer, Developing Programs for Adults in Public Service and Other Fields (Englewood-Cliffs, New Jersey, 1972), pp. 11, 12.

[22]Allan B. Knox, Program Evaluation in Adult Basic Education (Tallahassee, 1971), p. 5.

[23]Ibid., p. 2.

[24]Steele and Moss, p. 4.

[25]Ibid., p. 5.

[26]Ibid., p. 10.

[27]Ibid., p. 3.

[28]Ibid., pp. 17-23.

[29]Robert E. Snyder, Guide to Teaching Techniques for Adult Classes (Englewood-Cliffs, New Jersey, 1972), p. 32.

[30]Malcolm Knowles, The Modern Practice of Adult Education (New York, 1973), p. 223.

[31]Miller, p. 18.

[32]Robert L. Buser and Harry Miller, "An Evaluation Instrument for Adult and Continuing Centers and Programs, 3rd Review" (Oklahoma State University Micro Film, 1972), p. 3.

[33]Miller, p. 19.

[34]Johnson and Ulmer, p. 39.

[35]Knox, p. 15.

[36]Ibid., pp. 6, 7.

[37]Miller, p. 5.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

The purpose of this chapter is to describe the methodology and design of the study. Included in this chapter are a description of the population that participated in the study, the procedures used for collecting the data, a description of the instruments, and the methods employed for analyzing the data.

Description of the Population

The subjects of this study were the members of the adult interest groups and organizations which were involved in the Total Community Awareness Program in the Tulsa, Oklahoma, metropolitan area. This Total Community Awareness Program was conducted from October 28, 1974, through November 15, 1974. These adult interest groups included civic, service, and professional organizations, church and school-related groups, and other special interest groups.

There were 52 of these groups, with over 6,600 people, which participated in a program presented by a space science education specialist. The size of these groups varied from a minimum of 20 to, in some cases, over 100 people. One group had an audience of 800 people. As stated previously, the purpose of these programs is to assist the audiences in

becoming more knowledgeable of, and in developing a better understanding and awareness for, space activities and their impact on society.

Collection of the Data

The collection of the data was achieved in the following manner. Twenty-four adult interest groups were selected from the 52 groups that participated in the Total Community Awareness Program in the Tulsa area. Of these 24 groups, 22 agreed to participate in the study. Hence the sample of the study was composed of these 22 groups. The selection of the original 24 groups was not a true random choice, but rather they were chosen to be representative of all of the special interests. That is, the selection included some of every type of the participating adult interest groups. For example, of the several Lions Clubs in the Tulsa area, two were selected at random to be in the sample. The same procedure was followed for the Chambers of Commerce, the Kiwanis Clubs, The Sertoma Clubs, several different professional organizations, the retired people's organizations, etc.

One group from each of these matched pairs of interest groups was selected at random and placed in a set, which was labeled "Set A." The remaining group from each pair was placed in a set, which was labeled "Set B." Thus, of the original 24 interest groups selected as the sample, 12 were in Set A and 12 were in Set B. Two of the groups in Set A preferred not to participate in the study. To the members of the other 10 groups of Set A was administered the pre-program instrument. This was done just prior to their witnessing a presentation by a space science education specialist to their adult interest group. The members of the 12 interest groups in Set B did not experience the pre-program

instrument, but they did witness a presentation by a space science education specialist.

Four weeks after each of the interest groups in Sets A and B had witnessed a presentation, the members of both sets, A and B, had an opportunity to participate in the post-program instrument. Previous arrangements had been made with an officer of each interest group to administer the post-program instrument at a future meeting.

Seven of the 10 groups in Set A which participated in the pre-program instrument also participated in the post-program instrument. Nine of the 12 groups in Set B which agreed to participate in the study returned the post-program instrument; three did not return them. Consequently, of the 22 groups that agreed, at the time of the program presentation or immediately thereafter, to participate in the study, 16 actually returned the post-program instrument.

The Instrument

The pre-program and post-program instruments were identical. The instrument was comprised of multiple-answer, multiple-choice type items. That is, each item may have had more than one correct answer. There were several reasons for using an instrument of this design, the primary reason being that the desired information and data could be obtained by using a relatively small number of items on the instrument. Also, knowledge of the subject matter sought by the instrument could readily be determined by using items of this nature. Finally, an instrument of this design has the advantages of being compact and easily administered. The items were of a general nature, dealing with five areas of space science--manned flight, application satellites, deep space probes,

future space programs, and aeronautics. The subjects of the instrument items were selected from official NASA publications which are distributed to the general public. The form, content, and interpretation of the items were validated by a panel of experts knowledgeable in space science and experienced in instrument design. This panel included space science education specialists, the Education Program Officer of a NASA Research Center, NASA scientists, college professors, and the Project Director of the SSEP. A copy of the instrument can be found in Appendix A.

Analysis of the Data

The primary purpose for analyzing the data was to determine if there is a significant gain in the knowledge of, and understanding and awareness for, space activities and their impact on society, by adult groups in the Tulsa area after their viewing a presentation by a space science education specialist in a Total Community Awareness Program. In order to accomplish this goal, several different statistical analyses were made with the aid of the IBM 360/I65 model computer located in the Computer Center at the Oklahoma State University. The computer programs used in the analyses of the data are programs which are used nationwide. These programs are provided by the Statistical Analysis System. They were designed and implemented by Anthony James Barr and James Howard Goodnight, the Department of Statistics, North Carolina State University, Raleigh, North Carolina.

For the statistical analyses, all of the members of the groups of Set A were combined and considered members of one set, the set that experienced both the pre-program and post-program instruments.

Similarly, all of the members of the groups of Set B were combined and considered members of one set, the set that experienced only the post-program instrument. In order to differentiate between the pre-program instrument scores and the post-program instrument scores of Set A, the pre-program instrument scores were labeled Set A_1 and the post-program instrument scores were labeled Set A_2. The post-program instrument scores of the members of Set B were labeled B_2.

In order to determine the influence or effect, if any, of the pre-program instrument on the members of Set A, a t-test for two independent samples was used on the scores of Sets A_2 and B_2. It was the intent of the process used in selecting the sample for this study that the Sets A and B would be homogeneous. It became apparent during the collection of the data that the two Sets A and B were not necessarily homogeneous. This was evident by the difference in their physical appearances. Therefore it became imperative to use t-tests for two independent samples on the subsets, determined by demographic characteristics, of the Sets A_2 and B_2. These t-tests served as a basis for determining the influence of the pre-program instrument on the members of the different subsets of the Set A, where the subsets were determined by the demographic characteristics.

After it was concluded that the pre-program instrument apparently had little or no influence or effect on the members of Set A, a correlated t-test for paired samples was conducted on the scores of Sets A_1 and A_2. Since it was not possible to pair all of the scores from the pre-program and post-program instruments for Set A, a t-test for unpaired samples was also conducted on the scores of Sets A_1 and A_2.

CHAPTER IV

PRESENTATION AND ANALYSES OF DATA

Introduction

The purposes of this chapter are to present the data collected during the study and to illustrate and summarize the results of the analyses of that data. The first part of the chapter contains the pre-program and post-program instrument results of Set A, the members of the groups which experienced both instruments, and the post-program instrument results of Set B, the members of the groups which comprised the rest of the sample of the study. The presentation of this data is categorized by demographic characteristics into the following categories--sex and marital status, occupation, annual income, educational background, and age.

A section on the testing of the hypotheses follows the section on the results of the instruments based upon demographic categorization. Included in this section are the statements of the hypotheses and the tables displaying the results of the t-test performed on the appropriate data for the testing of the hypotheses. There are two major and fifteen minor hypotheses stated along with their respective tables displayed.

The final section of this chapter is a summary of the analyses of the collected data. Summarized here are the hypotheses and the rationale for accepting or rejecting them.

Results Based on Demographic Categorization

This section contains the results of the pre-program and post-program instruments experienced by the sample of the study. In the section "Collection of the Data," found in Chapter II, is a discussion of the criteria used for dividing the sample into two sets. Set A of the sample were the members of the groups involved in the study which experienced both the pre-program instrument and the post-program instrument. The remainder of the sample, which experienced only the post-program instrument, were the members of Set B. Both sets of the sample received the same treatment, witnessing a program presented by a space science education specialist.

The information shown in the fifteen tables in this section summarizes the results of the pre-program and post-program instruments for the subsets of A and B determined by the demographic characteristics. The "No Answer" category on a table means that a member (or members) of a set experienced the instrument but did not identify himself (themselves) with respect to that category.

The information shown in Table I summarizes the results of the pre-program instrument for Set A categorized by sex and marital status. There were 284 members of Set A. A majority, 59.5%, of them were married males. This category of married males had the highest mean score of the four categories. It appears that the men were more knowledgeable of, and had a better understanding and awareness for, space activities and their impact on society than did the women prior to witnessing a program. (See Table I.)

TABLE I

SUMMARY OF THE RESULTS OF THE PRE-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY SEX AND MARITAL STATUS

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Married Males	169	59.5	32.27	4.33	19	41
Married Females	79	27.8	27.87	4.29	19	37
Single Males	26	9.1	30.69	4.42	19	38
Single Females	9	3.2	28.67	4.85	21	35
No Answer	1	0.4	32.00	0.00	32	32
Total	284	100.0	29.60			

The information shown in Table II summarizes the results of the pre-program instrument for Set A categorized by occupation. The category labeled "Unemployed" includes adult students and wives not employed outside of the home. It is of interest to note that the highest score occurred in the self-employed category, but this category had a mean score very near the mean score of the category with the lowest mean score. (See Table II.)

The information shown in Table III summarizes the results of the pre-program instrument for Set A categorized by annual income. Here again, the highest individual score occurred in the category that had the next to lowest mean score, the $12,000 or less annual salary category. The category labeled "Unemployed" included adult, full-time students and wives not employed outside of the home. (See Table III.)

TABLE II

SUMMARY OF THE RESULTS OF THE PRE-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY OCCUPATION

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Blue Collar	20	7.1	30.80	4.58	23	39
Office Worker	47	16.6	29.64	4.27	20	37
Self-Employed	39	13.7	28.00	4.95	20	41
Professional	114	40.1	30.82	4.02	19	38
Unemployed	64	22.5	27.98	4.29	19	37
Total	284	100.0	29.60			

TABLE III

SUMMARY OF THE RESULTS OF THE PRE-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY ANNUAL INCOME

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
$12,000 or less	72	25.35	29.33	4.73	20	41
$12,000 - 17,999	80	28.17	29.74	4.49	21	37
$18,000 - 24,000	44	15.49	31.14	4.04	19	39
Over $24,000	40	14.09	30.33	3.98	19	38
Unemployed	48	16.90	27.75	4.18	19	37
Total	284	100.00	29.60			

The information shown in Table IV summarizes the results of the pre-program instrument for Set A categorized by educational background. It may be of interest to observe that, as the educational background of the members of this sample increased, likewise did the mean scores of their respective categories increase. This phenomenon seems to imply that the higher the educational background of a member of the population is, the greater his knowledge of, and understanding and awareness for, space activities and their impact on society will be.

TABLE IV

SUMMARY OF THE RESULTS OF THE PRE-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY EDUCATIONAL BACKGROUND

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
H. S. Diploma or less	145	51.0	28.96	4.59	19	41
Baccalaureate	81	28.5	30.40	3.98	21	37
Post-Graduate	36	12.8	30.56	4.70	19	38
Doctor's Degree	10	3.5	31.50	4.09	22	37
No Answer	12	4.2	27.50	3.94	23	34
Total	284	100.0	29.60			

The information shown in Table V summarizes the results of the program instrument for Set A categorized by age. About one third, 33.8%, of Set A were in the less than 35 years of age category. The data on Table V and Table XXXIII (see page 65) clearly show that the mean score in this age category was more than one standard deviation above the mean score of any other age category in Set A. Therefore, it appears that the youngest one-third of the population is the most knowledgeable of, and has a better understanding and awareness for, space activities and their impact on society before the population witnesses a presentation.

TABLE V

SUMMARY OF THE RESULTS OF THE PRE-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY AGE

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Less than 35	96	33.8	35.10	4.06	21	41
35 - 44	58	20.4	29.64	4.66	19	38
45 - 55	70	24.7	29.95	4.32	19	38
More than 55	56	19.7	27.50	4.64	19	35
No Answer	4	1.4	30.25	2.06	28	32
Total	284	100.0	29.60			

The information shown on Table VI through Table XV, inclusively, summarizes the results of the post-program instruments for both Set A and Set B. The data on Table VI summarizes the post-program instrument of Set A categorized by sex and marital status, while the data on Table VII summarizes it for Set B. The greatest percent, 98%, of Set A were in the married categories, while the greatest percent, 96.8%, were in the male categories of Set B. (See Table VII.)

TABLE VI

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY SEX AND MARITAL STATUS

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Married Males	79	66.3	31.00	4.31	22	39
Married Females	33	27.7	30.42	3.93	21	36
Single Males	5	4.2	30.60	7.42	20	39
Single Females	1	0.9	34.00	0.00	34	34
No Answer	1	0.9	35.00	0.00	35	35
Total	119	100.0	30.88			

TABLE VII

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET B CATEGORIZED BY SEX AND MARITAL STATUS

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Married Males	128	68.8	31.27	4.24	19	41
Married Females	5	2.7	29.60	4.39	24	34
Single Males	52	28.0	31.19	4.07	21	40
Single Females	1	0.5	26.00	0.00	26	26
Total	186	100.0	31.18			

The data on Table VIII summarizes the results of the post-program instrument of Set A categorized by occupation, while the data on Table IX summarizes it for Set B. In both sets the professional category had the largest percentage of cases, 50.5% of Set A and 33.6% of Set B. The blue collar category of Set A had the lowest mean score, 30.14, while the blue collar category of Set B had the highest mean score, 32.08. But the number of cases in the blue collar category of Set A, 7, is not large enough to lend itself to sound statistical conclusions. (See Table VIII and Table IX.)

TABLE VIII

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY OCCUPATION

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Blue Collar	7	5.9	30.14	2.67	27	34
Office Worker	29	24.4	30.82	4.27	23	39
Self-Employed	22	18.5	30.45	4.55	21	39
Professional	40	33.6	31.28	4.67	20	39
Unemployed	21	17.6	30.86	4.14	21	36
Total	119	100.0	30.88			

TABLE IX

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET B CATEGORIZED BY OCCUPATION

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Blue Collar	39	21.0	32.08	3.46	25	40
Office Worker	20	10.8	30.25	4.22	21	35
Self-Employed	29	15.6	29.69	4.67	19	38
Professional	94	50.5	31.78	3.98	19	41
Unemployed	4	2.1	23.75	1.26	22	25
Total	186	100.0	31.18			

The data on Table X summarizes the results of the post-program instrument of Set A categorized by annual income, while the data on Table XI summarizes it for Set B. In both sets the over $24,000 annual income category had the highest mean score, 31.45 in Set A and 32.30 in Set B. Likewise, in both sets the $18,000 - $24,000 annual income category had the lowest mean score, 30.06 in Set A and 30.90 in Set B. In Set A the percentage of the members in each category were relatively the same, but in Set B more than 50%, 55.9% of the members, were in the $12,000 or less annual income category. (See Table X for Set A and Table XI for Set B.)

TABLE X

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY ANNUAL INCOME

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
$12,000 or less	25	21.0	31.12	4.42	21	39
$12,000 - 17,999	32	26.9	31.09	4.57	23	39
$18,000 - 24,000	22	18.5	30.06	3.72	23	37
Over $24,000	20	16.8	31.45	4.84	20	39
Unemployed	20	16.8	30.60	4.08	21	36
Total	119	100.0	30.88			

TABLE XI

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET B CATEGORIZED BY ANNUAL INCOME

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
$12,000 or less	104	55.9	30.93	4.19	21	41
$12,000 - 17,999	22	11.8	31.59	4.19	25	38
$18,000 - 24,000	31	16.7	30.90	4.54	19	36
Over $24,000	23	12.4	32.30	3.61	25	39
Unemployed	6	3.2	31.00	4.98	24	37
Total	186	100.0	31.18			

The data on Table XII summarizes the results of the post-program instrument of Set A categorized by educational background, while the data on Table XIII summarizes it for Set B. In both sets the high school diploma or less category had the lowest mean score, 29.93 in Set A and 30.80 in Set B. On the other hand, the highest mean score, 32.22, in Set A was in the baccalaureate category while in Set B the doctor's degree category had the highest mean score, 32.17. The small number of cases in the doctor's degree category of Set A does not allow for sound statistical conclusions to be reached about that category. (See Table XII for Set A and Table XIII for Set B.)

The data on Table XIV summarizes the results of the post-program instrument of Set A categorized by age, while the data on Table XV summarizes it for Set B. In both sets the over 55 year category had the

TABLE XII

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY EDUCATIONAL BACKGROUND

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
H. S. Diploma or less	54	45.4	29.93	4.48	21	38
Baccalaureate	37	31.1	32.22	3.66	25	39
Post-Graduate	19	16.0	30.84	4.97	20	39
Doctor's Degree	5	4.2	31.20	2.39	27	33
No Answer	4	3.3	31.25	4.92	27	36
Total	119	100.0	30.88			

TABLE XIII

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET B CATEGORIZED BY EDUCATIONAL BACKGROUND

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
H. S. Diploma or less	97	52.2	30.80	4.58	19	41
Baccalaureate	45	24.2	31.78	3.91	19	37
Post-Graduate	29	15.6	31.21	3.61	24	39
Doctor's Degree	12	6.4	32.17	3.21	26	37
No Answer	3	1.6	30.00	4.36	25	33
Total	186	100.0	31.18			

lowest mean score, 28.56 in Set A and 30.53 in Set B. In Set A, as the category age classification increased, the mean scores of the categories decreased. This was not the case in Set B. In Set B the 35 - 45 year category had the highest mean score. (See Table XIV for Set A and Table XV for Set B.)

TABLE XIV

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET A CATEGORIZED BY AGE

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Less than 35	40	33.6	32.25	3.52	21	39
35 - 44	20	16.8	31.15	4.03	30	36
45 - 55	28	23.5	30.79	4.65	21	38
More than 55	27	22.7	28.56	4.38	22	39
No Answer	4	3.4	32.25	5.56	24	36
Total	119	100.0	30.88			

TABLE XV

SUMMARY OF THE RESULTS OF THE POST-PROGRAM INSTRUMENT OF SET B CATEGORIZED BY AGE

Category	Number of Cases	Percent	Mean Score	Standard Deviation	Low Score	High Score
Less than 35	95	51.1	31.21	4.60	19	41
35 - 44	30	16.1	32.00	3.59	22	39
45 - 55	26	14.0	31.00	4.17	22	38
More than 55	34	18.3	30.53	3.53	24	37
No Answer	1	0.5	30.00	0.00	30	30
Total	186	100.0	31.18			

Testing the Hypotheses

This section contains the two major hypotheses and the fifteen minor hypotheses of this study. Included also are the tables which display the results of the tests used on the hypotheses. The hypotheses in this study are stated in the null form.

> H_1: The post-program instrument mean score of adults experiencing the pre-program instrument prior to witnessing a presentation by a space science education specialist will not differ significantly from the post-program instrument mean score of adults not experiencing the pre-program instrument prior to witnessing a presentation.

The purpose for testing this hypothesis is to aid in establishing that it is questionable or even doubtful whether the pre-program instrument had an influencing effect on the post-program instrument scores of Set A. For testing this hypothesis, a t-test for two independent samples was used on Sets A and B. A summary of the results of that test is the

information contained in Table XVI. With 303 degrees of freedom, the t-value of 0.59 was well below the .05 level of significance. Therefore the hypothesis cannot be rejected. Hence it appears that there is no significant difference between the means of the post-program instrument scores of Sets A and B.

TABLE XVI

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A[1]	119	30.88	4.31	0.40		
					303	0.59 N.S.
Set B[2]	186	31.18	4.19	0.31		

[1]Set A experienced the pre-program instrument also.
[2]Set B experienced only the post-program instrument.
Table t = 1.96 at .05 level

It was pointed out in Chapter III, on page 36, that there was some doubt about the homogeneity of the Sets A and B. Therefore it became imperative to compare the subsets of Sets A and B determined by similar demographic characteristics. The comparisons were made by testing the hypotheses that the post-program instrument mean scores of the subsets, determined by demographic characteristics, of Set A did not differ significantly from the post-program instrument mean scores of the subsets determined by the same demographic characteristics of Set B.

It is possible to identify 20 subsets of Set A, determined by the demographic characteristics used in this study, and pair them, for hypotheses testing purposes, with 20 subsets of B determined by the same characteristics. The mean scores of the post-program instruments of 5 of these pairs of subsets could not be tested for significant differences because the number of cases in the subset of A, or of B, was not sufficiently large for sound statistical analyses. The 15 hypotheses, previously referred to as the minor hypotheses of the study, state that there is no significant difference between the post-program instrument scores of the subsets of A and B determined by demographic characteristics. The hypotheses and the summaries of the relevant data in the testing of them, Table XVII through Table XXXI, are contained in the remainder of this section.

> H_2: There is no significant difference between the post-program instrument scores of the married males of Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.45. With 205 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in testing this hypothesis is presented in Table XVII. (See Table XVII.)

> H_3: There is no significant difference between the post-program instrument scores of the office workers of Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.50. With 47 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of the hypothesis is presented in Table XVIII. (See Table XVIII.)

TABLE XVII

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THE MARRIED MALES OF SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	79	31.00	4.31	0.49		
					205	0.45 N.S.
Set B	128	31.27	4.24	0.38		

Table t = 1.96 at .05 level

TABLE XVIII

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THE OFFICE WORKERS OF SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	29	30.86	4.27	0.79		
					47	0.50 N.S.
Set B	20	30.25	4.22	0.94		

Table t = 2.01 at .05 level

H_4: There is no significant difference between the post-program instrument scores of the self-employed people of Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.59. With 49 degrees of freedom, the t-value was below the .05 level of

significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of the hypothesis is presented in Table XIX.

TABLE XIX

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THE SELF-EMPLOYED PEOPLE OF SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	22	30.45	4.55	0.98		
					49	0.59 N.S.
Set B	29	29.69	4.69	0.87		

Table t = 2.01 at .05 level

H_5: There is no significant difference between the post-program instrument scores of the professional people in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.63. With 132 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of the hypothesis is presented in Table XX. (See Table XX.)

TABLE XX

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THE PROFESSIONAL PEOPLE OF SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	40	31.28	4.67	0.74		
					132	0.63 N.S.
Set B	94	31.78	3.98	0.41		

Table t = 1.98 at .05 level

H_6: There is no significant difference between the post-program instrument scores of those whose annual income is less than $12,000 in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.20. With 127 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of the hypothesis is presented in Table XXI. (See Table XXI.)

H_7: There is no significant difference between the post-program instrument scores of those whose annual income is between $12,000 and $17,999 in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.41. With 52 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXII. (See Table XXII.)

TABLE XXI

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE ANNUAL INCOME IS LESS THAN $12,000 IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	25	31.12	4.42	0.88		
					127	0.20 N.S.
Set B	104	30.93	4.19	0.41		

Table t = 1.98 at .05 level

TABLE XXII

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE ANNUAL INCOME IS BETWEEN $12,000 AND $17,999 IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	32	31.09	4.58	0.81		
					52	0.41 N.S.
Set B	22	31.59	4.19	0.89		

Table t = 2.01 at .05 level

H_8: There is no significant difference between the post-program instrument scores of those whose annual income is between $18,000 and $24,000 in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.73. With 51 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXIII.

TABLE XXIII

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE ANNUAL INCOME IS BETWEEN $18,000 AND $24,000 IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	22	30.05	3.72	0.79		
					51	0.73 N.S.
Set B	31	30.90	4.54	0.82		

Table t = 2.01 at .05 level

H_9: There is no significant difference between the post-program instrument scores of those whose annual income is more than $24,000 in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.66. With 41 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXIV.

TABLE XXIV

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE ANNUAL INCOME IS MORE THAN $24,000 IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	20	31.45	4.84	1.08		
					41	0.66 N.S.
Set B	23	32.30	3.61	0.75		

Table t = 2.02 at .05 level

H_{10}: There is no significant difference between the post-program instrument scores of those whose educational background is a high school diploma or less in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 1.14. With 149 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXV. (See Table XXV.)

H_{11}: There is no significant difference between the post-program instrument scores of those whose educational background is a baccalaureate degree in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.52. With 80 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXVI. (See Table XXVI.)

TABLE XXV

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE EDUCATIONAL BACKGROUND IS A HIGH SCHOOL DIPLOMA OR LESS IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	54	29.93	4.47	0.61		
					149	1.14 N.S.
Set B	97	30.80	4.58	0.47		

Table t = 1.98 at .05 level

TABLE XXVI

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE EDUCATIONAL BACKGROUND IS A BACCALAUREATE DEGREE IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	37	32.22	3.66	0.60		
					80	0.52 N.S.
Set B	45	31.78	3.91	0.58		

Table t = 1.99 at .05 level

H_{12}: There is no significant difference between the post-program instrument scores of those whose educational background includes post-graduate work in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.29. With 46 degrees of freedom, the t-value was below the .05 level of

significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXVII.

TABLE XXVII

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE EDUCATIONAL BACKGROUND INCLUDES POSTGRADUATE WORK IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	19	30.84	4.97	0.14		
					46	0.29 N.S.
Set B	29	31.21	3.61	0.67		

Table t = 2.02 at .05 level

H_{13}: There is no significant difference between the post-program instrument scores of those whose age is less than thirty-five years in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 1.28. With 133 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXVIII. (See Table XXVIII.)

TABLE XXVIII

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE AGE IS LESS THAN THIRTY-FIVE YEARS IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	40	32.25	3.52	0.56		
					133	1.28 N.S.
Set B	95	31.21	4.60	0.47		

Table t = 1.98 at .05 level

H_{14}: There is no significant difference between the post-program instrument scores of those whose age is between thirty-five and forty-four years in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.78. With 48 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXIX. (See Table XXIX.)

H_{15}: There is no significant difference between the post-program instrument scores of those whose age is between forty-five and fifty-five years in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 0.18. With 52 degrees of freedom, the t-value was below the .05 level of significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXX. (See Table XXX.)

TABLE XXIX

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE AGE IS BETWEEN THIRTY-FIVE AND FORTY-FOUR YEARS IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	20	31.15	4.03	0.90		
					48	0.78 N.S.
Set B	30	32.00	3.59	0.66		

Table t = 2.02 at .05 level

TABLE XXX

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE AGE IS BETWEEN FORTY-FIVE AND FIFTY-FIVE YEARS IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	28	30.79	4.65	0.88		
					52	0.18 N.S.
Set B	26	31.00	4.17	0.82		

Table t = 2.01 at .05 level

H_{16}: There is no significant difference between the post-program instrument scores of those whose age is more than fifty-five years in Sets A and B.

For testing this hypothesis, a t-test yielded a value of 1.95. With 59 degrees of freedom, the t-value was below the .05 level of

significance. Therefore the hypothesis cannot be rejected. A summary of the relevant data in the testing of this hypothesis is presented in Table XXXI.

TABLE XXXI

t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE POST-PROGRAM INSTRUMENT SCORES OF THOSE WHOSE AGE IS MORE THAN FIFTY-FIVE YEARS IN SETS A AND B

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Set A	27	28.56	4.38	0.84		
					59	1.95 N.S.
Set B	34	30.53	3.53	0.61		

Table t = 2.00 at .05 level

It is of interest to note that none of the fifteen minor hypotheses were rejected. It appears from the previously presented data that the pre-program instrument did not influence the scores of the post-program instrument for Set A.

The second major hypothesis of this study is stated as the final hypothesis of the study.

> H_{17}: The pre-program instrument mean score of a set of adults, prior to witnessing a presentation by a space science education specialist, will not differ significantly from the post-program instrument mean score of the same set of adults after witnessing the presentation.

The results from the testing of this hypothesis served as the basis for the summary of this study. Two different tests were used, one was a correlated t-test for paired samples, the other was a t-test for unpaired samples. Because of the coding on the instruments it was possible to pair 57 pre-program instruments from Set A with the 57 post-program instruments answered by the same individuals. The correlated t-test for paired samples was used to test the hypothesis for these 57 cases. A t-test for unpaired samples was used to test the hypothesis for the entire Set A.

A summary of the results of the correlated t-test used for testing this hypothesis is the data contained in Table XXXII. With 56 degrees of freedom, the t-value of 5.62 was higher than the .05 level. Therefore the hypothesis must be rejected. The correlation coefficient, r, was equal to approximately 0.59.

TABLE XXXII

CORRELATED t-TEST DATA FOR PAIRED SAMPLES FOR THE RELATIONSHIP BETWEEN THE PRE-PROGRAM AND POST-PROGRAM INSTRUMENT SCORES OF THE ADULTS EXPERIENCING BOTH INSTRUMENTS

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Pre-Program	57	29.98	4.19	0.55		
					56	5.62*
Post-Program	57	32.53	2.99	0.40		

*Significant at the .05 level
Table t = 2.01 at .05 level
r = .59

Testing this hypothesis for the entire Set A, an unpaired t-test yielded a t-value of 2.66. With 401 degrees of freedom, the t-value was significant at the .05 level. Therefore the hypothesis must be rejected. For a summary of the relevant data in the testing of this hypothesis, see Table XXXIII.

TABLE XXXIII

UNPAIRED t-TEST DATA FOR THE RELATIONSHIP BETWEEN THE PRE-PROGRAM AND POST-PROGRAM INSTRUMENT SCORES OF THE ADULTS EXPERIENCING BOTH INSTRUMENTS

Source	Number of Cases	Mean Score	Standard Deviation	Standard Error	Degrees of Freedom	t Value
Pre-Program	284	29.60	4.46	0.26		
					401	2.66*
Post-Program	119	30.88	4.31	0.39		

*Significant at the .05 level
Table t = 1.96 at .05 level

Summary

Two major and fifteen minor hypotheses were tested. The results of the tests on the first major hypothesis seem to indicate that experiencing the pre-program instrument has no influence over the results of the post-program instrument score. The results of the tests on all of the minor hypotheses concur with this premise.

The second major hypothesis was rejected by both the correlated t-test and the t-test for unpaired samples. The rejection of this hypothesis in both situations implies that it is likely that there will be a significant difference in the mean scores of the pre-program and post-program instruments when a sample experiences both of them. The t-value of 5.62 on the correlated t-test for paired samples was so high that the author was unable to find a table which gave a value for that level of significance.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The primary purpose of this study was to evaluate the effectiveness of the SSEP's efforts in the dissemination of knowledge about NASA's space activities to adults. The specific method under investigation was the slide-lecture presentation. Adult interest groups participating in the Total Community Awareness Program in the Tulsa, Oklahoma, area were chosen as the sample for the study.

Nineteen of 66 groups in the Tulsa program participated, with 16 of them participating in the follow-up study through the post-program instrument. The sample was divided into two sets. One set, Set A, experienced both instruments, one before witnessing the presentation, the other one four weeks afterwards. The other part of the sample, Set B, experienced only the post-program instrument, four weeks after witnessing the presentation.

Summary of Findings

Two major and 15 minor hypotheses were subjected to a t-test, either for paired, unpaired, or for independent samples, for test of significance. All of the hypotheses were tested at the .05 level of significance.

The results of the pre-program and post-program instruments were categorized with respect to demographic characteristics. These categories were: (1) sex and marital status, (2) occupation, (3) annual income, (4) educational background, and (5) age. Three of these categories had four, and the other two had five, sub-categories. Table I through Table XV contain the pertinent information on the results of the pre-program and post-program instruments for Set A and the results of the post-program instrument for Set B. There were 284 adults of Set A who experienced the pre-program instrument and 119 who experienced the post-program instrument. Set B contained 186 adults who experienced the post-program instrument. (These figures are based upon the usable instruments returned for analysis purposes.)

Hypothesis one, a major hypothesis which was not rejected, in essence stated that there was no difference in the post-program scores of the two sets, A and B. This seems to imply that the pre-program instrument had no influence on the post-program instrument scores of Set A. It should be pointed out that the pre-program instrument may have had some effect on Set A, but that this effect was neutralized by some other unobserved variable or variables.

Of the 15 minor hypotheses tested, hypothesis two through hypothesis 16, none were rejected. These hypotheses were similar to hypothesis one, except they were tested on subsets of A and B determined by demographic characteristics. In every case tested, the results seem to imply that the pre-program instrument had no influence on the post-program instrument scores. The other demographically equivalent subsets were insufficiently large to be subjected to the analyses.

The assumption that the pre-program instrument had no effect on the post-program instrument scores of Set A serves as a basis for hypothesis 17, the other major hypothesis of this study. This hypothesis in essence states that there will be no significant difference in the knowledge of, and understanding and awareness for, space activities and their impact on society, of a group of adults before and after witnessing a presentation by a space science education specialist. Since this hypothesis was rejected under both tests, it appears from the data analyzed that there will be a significant difference in the knowledge, understanding, and awareness of adults.

Implication and Recommendation

It should be pointed out that this study was conducted on the population of a select area of the country, the Tulsa metropolitan area. Although the results of the study apparently indicate that the efforts of the SSEP with adult groups seem to satisfy their intended purposes, the author recommends that future studies, similar to this one, be conducted on adult population samples in other areas of the country and that the results of those studies be compared with the results of this study. Only then will the SSEP obtain a clear indication of the success of their efforts with the adult population.

SELECTED BIBLIOGRAPHY

Adult Education Association of the U. S. A. Federal Support for Adult Education, 1969 Directory of Programs and Services. Toronto: MacMillan, 1969.

Bernardo, James V. "NASA's Educational Programs." Educational Guidance in the Space Age, EP 20 (March, 1964), pp. 8, 9.

Brack, R. F. "An Eclectic Approach to Evaluation Strategies." Paper presented at the Adult Education Research Conference, Chicago, 1972.

Buser, Robert L. and Harry Miller. "An Evaluation Instrument for Adult and Continuing Education Centers and Programs." 3rd Review (Summer, 1972), pp. 1-27.

Grobman, Hulda. AERA Monograph Series, 1. Chicago: Rand-McNally, 1968.

Harris, Wilbur. "The Nature and Function of Educational Evaluation." Peabody Journal of Education, 46 (September, 1968), pp. 95-99.

Helton, Robert Dale. "A Study of Aerospace Education Workshops Which Utilize NASA Materials and Resource Personnel." (Unpub. Doctoral thesis, Oklahoma State University, 1973.)

Johnson, Eugene I. and Curtis Ulmer. Developing Programs for Adults. Englewood-Cliffs, New Jersey: Prentice-Hall, 1972.

Kempfer, Homer. Adult Education. New York: McGraw-Hill, 1973.

Knowles, Malcolm S. The Modern Practice of Adult Education. New York: Association Press, 1973.

Knox, Alan B. Program Evaluation in Adult Basic Education. Tallahassee, Florida: Florida State University Research Information Processing Center, 1971.

Lenzer, Antony. "Course Evaluation, More Necessary Than Evil." Adult Leadership, XVIII (November, 1969), pp. 139-140.

Liveright, A. A. A Study of Adult Education in the U. S. Boston: The Center for the Study of Liberal Education for Adults at Boston University, 1968.

Luke, Robert. How to Train Teachers to Train Adults. Englewood-Cliffs, New Jersey: Prentice-Hall, 1971.

Miller, Harry L. and Christine H. McQuire. Evaluating Liberal Adult Education. Chicago: The Center for the Study of Liberal Education for Adults, 1961.

Reeves, Elton T. and J. Michael Jensen. "Effectiveness of Program Evaluation." Training and Development Journal, 26 (1972), pp. 36-41.

Runyon, Richard P. and Audrey Haber. Fundamentals of Behavioral Statistics. Reading, Pa.: Addison-Wesley, 1971.

Scriven, Michael et al. AERA Monograph Series of Curriculum Evaluation, The Method of Evaluation. Chicago: Rand-McNally, 1967.

Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill, 1956.

Snyder, Robert E. A Guide to Teaching Techniques for Adult Classes. Englewood-Cliffs, New Jersey: Prentice-Hall, 1972.

Steele, Sara M. and Gwenna M. Moss. "The Criteria Problem in Program Evaluation." Paper presented at the Adult Education Research Conference, Minneapolis, February 27, 1970.

Trant, David. Evaluation of Adult Education. Washington: Department of Health, Education, and Welfare, March, 1970.

Walker, Helen M. and Joseph Lev. Elementary Statistical Methods. New York: Holt, Rinehart, and Winston, 1969.

APPENDIX A

INSTRUMENTS

For the past five years Oklahoma State University has provided personnel and administrative services to the National Aeronautics and Space Administration for the Space Science Education Project. One of the most active areas of these services has been with adult groups.

Your participation in this study will aid in the development of programs which better satisfy the needs and interests of these groups. Thank you for your cooperation.

— — — — —

INSTRUMENT

This instrument is designed to measure your knowledge and understanding of, and awareness for, space activities and their impact on society. Please circle the letters representing answers which you feel are correct. There may be more than one correct answer for each item. Therefore, be sure to consider all possible answers.

Examples:

a (b) (c) d I. The St. Louis Cardinals are a professional (a) basketball (b) football (c) baseball (d) hockey team. (Two correct answers.)

a (b) c d II. Oklahoma State University is a member of the (a) Big Ten (b) Big Eight (c) Southwest (d) Western Athletic Conference. (One correct answer.)

a b c d 1. I am a (a) married male (b) married female (c) single male (d) single female.

a b c d 2. My primary occupation is that of a (a) blue collar worker (b) office worker (c) self-employed person (d) professional.

a b c d 3. My average annual income is (a) less than $12,000 (b) $12,000 - $17,999 (c) $18,000 - $24,000 (d) more than $24,000.

a b c d 4. My educational background includes (a) high school diploma or less (b) baccalaureate degree (c) post-graduate work (d) doctor's degree.

a b c d 5. My age falls into the following category (a) less than 35 (b) 35 - 44 (c) 45 - 55 (d) more than 55 years of age.

Some of the following may have more than one correct answer. Mark all of the correct answers.

a b c d 6. Unmanned spacecraft in orbit today which provide benefits to mankind include (a) communication satellites (b) navigation satellites (c) weather satellites (d) earth resources satellites.

a b c d 7. The early manned space programs, Mercury and Gemini, were concerned mainly with (a) solar experiments and investigations (b) man's ability to survive in space (c) man's ability to work in space (d) studying space from above atmospheric interference.

a b c d 8. The Skylab program tested equipment and techniques to gather information on (a) the sun and solar radiation (b) other planets in our solar system (c) the moon and its geology (d) the earth's atmosphere and geology.

a b c d 9. NASA is involved in aeronautical research in (a) more convenient passenger service (b) general aviation aircraft (c) quieter jet engines (d) landing approach procedures to reduce the area affected by jet noises.

a b c d 10. The Space Shuttle (a) will be able to send most unmanned applications spacecraft into orbit (b) is one of several manned space programs planned for the 1980's (c) is basically a transportation system between the earth and earth orbit (d) will be used primarily to explore the other planets.

a b c d 11. The total NASA budget (a) is spent on earth to buy materials and skills (b) costs each citizen an average of more than $20 per year in taxes (c) is more than 1½% of the total government budget (d) could alternately be used to add significantly to the budget of social programs.

a b c d 12. Interplanetary exploration (a) increases our understanding of our own planet (b) has left unchanged our concepts of other planets (c) has reaffirmed our belief in the non-existence of life elsewhere in our universe (d) has been accomplished by soft landing spacecraft on other planets.

a b c d 13. With the aid of satellites, such as the Earth Resources Technology Satellite (ERTS), and their remote sensors (a) it is still impossible to identify crops and crop diseases from space (b) man can better manage his timber resources (c) water pollution in lakes and rivers can be detected from space (d) petroleum and mineral deposits can be detected from space.

a b c d 14. Orbiting satellites (a) perform some tasks which cannot be done on earth (b) perform some tasks more efficiently and effectively than can be done on earth (c) work only for NASA and no other government agencies (d) reduce the costs of some services for mankind.

a b c d 15. The United States is involved in the first international manned space flight planned for mid-1975. The project is called (a) Intelstat in cooperation with Great Britain (b) Aloulette in cooperation with France (c) Apollo-Soyuz in cooperation with Russia (d) Viking in cooperation with Sweden.

a b c d 16. Skylab was an experimental, orbiting space laboratory where three-man crews conducted (a) scientific (b) aeronautical (c) work-effectiveness (d) biomedical investigations and experiments.

APPENDIX B

COVER LETTER

November ___, 1974

_____

_____

_____

Dear Mr. _____:

On _____, November ___, 1974, I made a presentation to the _____. This presentation was part of a space awareness program being conducted in the Tulsa metropolitan area.

At the time of the presentation, I requested your cooperation and participation in a study being conducted on a select group of organizations in the Tulsa area. The purpose of this study is to aid in the development of programs which better satisfy the needs and interests of these groups.

Enclosed is a questionnaire that we would like to have the members of the _____answer at your meeting on _____ _____, December ____, 1974. Also enclosed you will find a stamped envelope for returning the instruments to the Education Research Foundation at Oklahoma State University.

In case there are some members present at your meeting who did not witness the presentation, please have them fill out a questionnaire and have them indicate on the front of it that they did not see the presentation.

Thank you for your cooperation in this study.

Kenneth E. Wiggins
Space Science Education Project Director

Larry Hapke
Space Science Education Specialist

sdd
Enclosures

VITA

Lawrence Henry Hapke

Candidate for the Degree of

Doctor of Education

Thesis: AN EVALUATION OF ADULT EDUCATION ACTIVITIES OF THE SPACE SCIENCE EDUCATION PROJECT IN A TOTAL COMMUNITY AWARENESS PROGRAM

Major Field: Higher Education

Biographical:

Personal Data: Born in Palatine, Illinois, June 25, 1936, the son of Albert G. and Elenora Hapke.

Education: Attended Immanuel Lutheran Elementary School in Palatine, Illinois; graduated from Palatine Township High School, Palatine, Illinois, in 1954; received the Bachelor of Science degree from Morningside College, Sioux City, Iowa, with a major in mathematics in June, 1958; awarded an NSF Summer Institute at Bowling Green State University, Bowling Green, Ohio, in 1963 and 1964; received the Master of Arts degree from Bowling Green State University with a major in mathematics in 1964; awarded an NSF Research Participation for High School Teachers of Mathematics grant at Colorado State University in 1965; awarded an NSF Research Participation for College Teachers of Mathematics grant at the University of Oklahoma in 1966 and 1967; awarded an NSF Summer Institute for College Teachers at the University of Georgia in 1969; attended the University of Minnesota as a part-time student in 1965, 1969, and 1972; completed requirements for the Doctor of Education degree at the Oklahoma State University in May, 1975.

Professional Experience: Teacher of social sciences at Columbian High School, Tiffin, Ohio, 1958-60; mathematics teacher and head football coach at Carey High School, Carey, Ohio, 1960-61; mathematics teacher and head basketball coach at Safford High School, Safford, Arizona, 1961-65, Assistant Professor of Mathematics at the University of Wisconsin-River Falls, 1965-73 (1973-75 on leave); research graduate assistant and aviation ground and flight instructor (part time), Oklahoma State University, Stillwater, Oklahoma, 1973-75.