1987

NASA/ASEE SUMMER FACULTY RESEARCH FELLOWSHIP PROGRAM

MARSHALL SPACE FLIGHT CENTER
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

COMPILATION AND DEVELOPMENT OF K-6 AEROSPACE MATERIALS FOR IMPLEMENTATION IN NASA SPACELINK ELECTRONIC INFORMATION SYSTEM

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Date:	August 7, 1987
Contract No:	The University of Alabama in Huntsville NGT-01-008-021

ABSTRACT

Spacelink is an electronic information service to be operated by the Marshall Space Flight Center. It will provide National Aeronautics and Space Administration (NASA) news and educational resources including software programs that can be accessed by anyone with a computer and modem. Spacelink is currently being installed and will soon begin service.

It will provide:

- Daily Updates on NASA Programs
- Information about NASA Educational Services
- Manned Space Flight
- Unmanned Space Flight
- Aeronautics
- NASA, the Agency
- Lesson Plans and Activities
- Space Program Spinoffs

Lesson plans and activities were extracted from existing NASA publications on aerospace activities for the elementary school. These materials were arranged into 206 documents which have been entered into the Spacelink program for use in grades K-6.

ACKNOWLEDGEMENT

I wish to express my deepest appreciation to the NASA/ASEE Summer Faculty Fellowship Program and its directors for the opportunity afforded me this summer. I extend deep gratitude to Mrs. Ernestine Cothran, Dr. Gerald Karr, and Dr. Willim Snoddy for the roles they played in this endeavor; to the members of the staff in Public Affairs for their tolerance and kindnesses; to Mrs. Vicki Sullivan for her expertise in teaching me word processing, and to the host of others who have lent their help in large and small ways to making my summer's experience a rewarding one. A large measure of my thanks goes to my colleague, Bill Anderson, who assigned me the project and, who did not leave a stone unturned in enabling me to have a fantastic experience.

1. Introduction

The National Aeronautics and Space Administration offers educators a wide range of educational services including speakers, publications, audiovisual materials, software, advanced educational technology, curriculum assistance, electronic communications, in-school satellite programs, student programs and training opportunities. Still in the developmental stage is the educational service Spacelink.

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Daily Updates on NASA Programs
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Aeronautics
NASA, the Agency
Lesson Plans and Activities
Space Program Spinoffs

The assignment this summer involved compiling lesson plans and activities for implementation in Spacelink. Material for this work was obtained from existing NASA publications on aerospace activities for elementary schools.

2. The Process

The material was first compiled on the word processor resulting in several typewritten pages. These were then organized into 206 documents (See Appendix.) each of which was loaded into the Spacelink program. The documents cover lesson plans and activities for living in space along with other aerospace activities.

The lesson plans for living in space include: food, clothing, communication, health, housing and working.

The lesson on Foods covers the following concepts:

1. The mode of preparation of food for space

2. The variety of food taken into space

3. The characteristics of food taken

4. The reason for the choice of food taken

5. How food is packaged for space

6. The eating utensils used in space

7. How a meal is prepared in space

8. How a meal is eaten in space

The lesson on Clothing covers the following concepts:

1. Appearance

2. Functional quality

3. Convenience

4. Safety features

5. Inventory

6. Body changes and their effect on clothing design

The lesson on Communication aims at teaching that in space:

1. Computers are essential for a successful mission.

2. Communication is handled by computers.

3. Communications satellites effect communication across great distances.

The lesson plan on health covers the following aspects:

1. Personal hygiene

2. The medical supplies and care that are available on the Space Shuttle

3. The necessity for proper waste management within the confines of the orbiter

4. The need to exercise to counteract the effects of living in a weightless environment

5. Personal storage lockers

The lesson plan on housing gives a description of:

1. Space Shuttle deck areas
2. The living areas of the Space Shuttle
3. Sleeping accommodations
4. Hatches and airlocks

The lesson plan on working covers:

1. The importance of each crew member performing specific jobs
2. The interactive roles of the astronauts on Space Shuttle missions
3. The variety of jobs that can be performed in space
4. The effect of weightlessnes on the body functions, body measurements and posture of the astronauts
5. The different ways in which astronauts must perform their jobs
6. The role of the manipulator arm
7. The extravehicular gear used for work in space

The other activities cover:

1. The characteristics of the Earth's atmosphere and its magnetosphere which must be considered in planning for flight in the atmosphere or in space
2. The principles of flight in the atmosphere which man had to apply in designing aircraft
3. Rocket engines, which carry with them all the necessary materials for propulsion, and are used to launch flights into the upper atmosphere or into space

4. Some of the technological advances that had to be made in many areas before a vehicle could be launched into space beyond the earth's atmosphere

5. Various types of unmanned satellites

6. The unmanned lunar, solar, and interplanetary satellites and probes that were sent to the moon and into interplanetary space to gather information about the solar system and its members

7. Pilot astronauts and mission specialist astronauts who are carefully selected and well-trained to operate American spacecraft

8. The testing and utilization of man's capabilities in space as he/she paves the way for the acquisition of new knowledge

9. Future projections in the further expansion of space technology and space exploration

10. Suggested research topics on each of the above intended primarily for the intermediate and upper grade levels of the elementary school

CONCLUSIONS and RECOMMENDATIONS

Everyone is aware of the need to develop more scientists in the nation and that mathematics and science at all levels must be strengthened. Since the foundation laid before the college experience is vital for success in a career in science, we must continue to be concerned about the future development of scientists.

One of the historic tasks at NASA has been the stimulation of students in the nation's schools to strive for excellence. Thus far, the material prepared for Spacelink is for use in Grades K-6 which is in keeping with NASA's effort to encourage students to take a greater interest in mathematics and science by attempting to reach them in their formative years. NASA must continue its development of elementary-level materials to be placed alongside the wealth of NASA materials available for secondary teachers and students.

Now that the computer has become the basic underpinning of the space program and society, it is important that this vital resource be maximized in keeping classroom science relevant through the medium called Spacelink.

REFERENCES

Elementary School Aerospace Activities, A Resource for Teachers, NASA,1977

Living in Space, Books I & II, NASA, 1987

APPENDIX

A Listing of the documents prepared for Spacelink, 1987

Lesson Plans & Activities

Living in Space
Food Lesson Plans
Clothing Lesson Plans
Health Lesson Plans
Housing Lesson Plans
Communication Lesson Plans
Working Lesson Plans

Food Lesson Plans
- Background, Grades 1-3
- Background, Grades 4-6
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Grade 6

Clothing Lesson Plans
- Background, Grades 1-3
- Background, Grades 4-6
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Grade 6

Health Lesson Plans
- Background, Grades 1-3
- Background, Grades 4-6
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Grade 6

Housing Lesson Plans
- Background, Grades 1-3
- Background, Grades 4-6

Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Grade 6

Communication Lesson Plans
Background, Grades 1-3
Background, Grades 4-6
Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Grade 6

Working Lesson Plans
Background, Grades 1-3
Background, Grades 4-6
Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Grade 6

Space Science Activities
Astronauts
Atmosphere
Magnetosphere
Flight in the Atmosphere
Rockets
Technological Advances
Unmanned Earth Satellites
Unmanned Exploration of the Solar System
Man in Space
Projections

Astronauts
Background
K-2
General
Physical requirements
3-4
General
Selection
Physical requirements
Training

5-6
General
Selection
Physical requirements
Training

Space Science Activities (Atmosphere)
Background
K-2
Weather
Temperature
Density & pressure
3-4
General
Weather
Temperature
Density & pressure
Jet Stream
Ionosphere
Gases & dust
5-6
General
Weather
Temperature
Density & pressure
Jet Stream
Radiation
Ionosphere
Gases & dust

Space Science Activities (Magnetosphere)
Background
General, K-2
3-4
General
Solar Wind
5-6
General
Magnetic lines of force
Radiation belts
Solar wind

Space Science Activities (Flight in the Atmosphere)
Background
K-2
General
Lighter-than-air craft
Heavier-than-air craft
Gravity, thrust drag
Problems of flight

3-4
General
Lighter-than-air craft
Heavier-than-air craft
Lift, gravity, thrust, drag
Problems of flight
International cooperation
5-6
General
Lighter-than-air craft
Heavier-than-air craft
Lift, gravity, thrust, drag
Problems of flight
International cooperation

Space Science Activities (Rockets)
Background
K-2
General
Newton's third law
Fuel
Launch vehicles
Multistaging
3-4
General
Newton's third law
Fuel
Guidance
Launch vehicles
Multistaging
Space Shuttle launch
5-6
General
Newton's third law
Fuel
Guidance
Launch vehicles
Multistaging
Space Shuttle launch

Space Science Activities (Technological Advances)
Background
K-2
General
Power
Navigation and guidance
Data collection
Spacecraft design

5-6
General
Moon
Sun
Planets & interplanetary space
International cooperation

Man in Space
Background
K-2
Man to the Moon
Skylab
Apollo Soyuz Test Project
Space Shuttle
3-4
General
Man to the Moon
Skylab
Apollo Soyuz Test Project
Space Shuttle
International cooperation
5-6
General
Man to the Moon
Skylab
Apollo Soyuz Test Project
Space Shuttle
International cooperation

Projections
Background
K-2
Further exploration of space
Solar system
3-4
General
Further exploration of space
Management of resources
Solar system
Universe
5-6
General
Further exploration of space
Management of resources
Utilization of space environment
Solar system
Universe

3-4
General
Power
Navigation and guidance
Data collection
Spacecraft design
5-6
General
Power
Navigation and guidance
Data collection
Spacecraft design

Unmanned Earth Satellites
Background
K-2
General
Weather & communication
Earth observation
Biosatellites
Physics & astronomy
3-4
General
Weather & communication
Earth observation
Applications technology
Biosatellites
Physics & astronomy
International cooperation
5-6
General
Weather & communication
Earth observation
Applications technology
Biosatellites
Physics & astronomy
International cooperation

Unmanned Exploration of the Solar System
Background
K-2
General
Moon
Sun
Planets & interplanetary space
3-4
General
Moon
Sun
Planets & interplanetary space
International cooperation