

<p>Title: “STS-125 Jr Mission Expert “</p> <p>Content Area: STEM</p> <p>Grade Level: 11-12</p> <p>Authors: Brian Tanner, Dave Brown, Ron Geier</p>	
--	--

Student Objectives:
(Includes National Science Standard)
Students will be able to:

1. Demonstrate desirable work habits, attitudes, and time management skills; and the ability to work cooperatively to solve a problem. *(NS 9-12.1)*
2. Apply the safety rules and safe operation of various hand tools, machines, materials and equipment. *(NS 9-12.5)*
3. Explore career opportunities related to NASA and other research and government organizations. *(NS 9-12.7)*
4. Solve real world problems using the systems model approach, higher level thinking skills, individual and collaborative ingenuity, and a variety of resources; including tools, materials, and other resources efficiently. *(NS 9-12.1,4,7)*
5. Access the historical perspective of technology and its impacts on future inventions and innovations. *(NS 9-12.4,6,7)*
6. Develop and evaluate alternate solutions to a given technological problem under specific design constraints. *(NS 9-12.1,5)*
7. Record and store all documentation, inputs, outcomes, sketches, and self- evaluations in a journal (either paper, digital log or web folio) *(NS 9-12.1)*
8. Integrate technological systems with other school disciplines; including social studies, science, math, and language arts. *(NS9-12.6)*
9. Develop an understanding of social and political impacts of technology. *(NS9-12.5,6,7)*
10. Develop skills in reading, writing, speaking, and listening communications to solve a given problem. *(NS 9-12.1)*
11. Demonstrate team work and leadership skills needed to prepare for the world of work. *(NS 9-12.1,5,6,7)*

National Science Standards
 (This list contains some of potential standards)

Content Area	Standard	Grade
Earth/Space Science	NS 9-12.4 Earth & Space Science	9-12
Science	NS 9-12.1 Science as Inquiry NS 9-12.5 Science and Technology	9-12
Language	NS 9-12.1 Science as Inquiry	9-12
Social Studies	NS 9-12.6 Personal and Social Perspectives	9-12
Reading/Writing	NS 9-12.1 Science as Inquiry	9-12



Purpose and Overview:

The purpose of this project is to familiarize the students with space exploration, its challenges and requirements. The Shuttle program will retire soon, and it has yielded a number of scientific advances that translate to cultural development in the sciences, mathematics and engineering fields. Students can learn about technology transfer, subject matter requirements, communications skills, life sciences and a host of other topics. This project utilizes the STS-125 Shuttle mission as a template for team building, problem solving and a better understanding of applying technology in creative and robust fashion. Even beyond the end of the Shuttle program, this mission can be used to study and evaluate complex planning and implementation of STEM subject matter. STS-125 has significant historical value.

The program allows teachers to assign roles to students, create pathways to find information using higher technology standards, and then teach them how to share the new knowledge in a collaborative way with peers. STS-125 can be done with small or large classrooms and over a period of a few days create a robust exercise that meets national science standards in a STEM delivery.

The Shuttle program started in 1981, and has been the heavy lift vehicle for satellite launches and space station assembly. It has been the work horse of the space program and undergone a number of technology upgrades over the years. The Shuttle proved to be successful and was used beyond its intended life. An interesting approach is to have students understand how programs are developed and in what ways they are modified based on lessons learned and technology changes over time. As part of this lesson, students can be exposed to the technology and the human assets required executing such a program. They can learn about the challenges that human kind faces when significant failures take place as well as when great successes are achieved.

It is intended that the students can identify career opportunities that support STEM fields by understanding the diverse subject matter expertise that is necessary to support space exploration. How do these jobs translate into other industry and academic programs other than NASA. What changes will/need to take place to engage more of the population and promote larger participation in the space industry? The student should be able to answer the following questions:

- What careers support the space industry?
- What resources are available to me to support my career objectives?
- How do I shape my future success based on my action now?
- What skill sets do I need to have to be successful as an individual?
- How do my personal choices in life affect my success later?
- How can I learn to navigate the NASA website and find pertinent information?
- How does teaching a subject create a better understanding for the presenter?

Instructional Activity:**Background Information:**

STS-125 will be the last mission to upgrade and repair the Hubble Space Telescope (HST) before its useful life has ended. This will also be one of the last missions of the Shuttle program. Seven students will be required to choose an STS-125 Mission crew member and shadow that crew member throughout the STS-125 mission prep and execution. The students should understand the background of their Mentor and key responsibilities to be carried out during the flight and Hubble servicing. Once that mission is complete, the students will take that knowledge to other students in the state and share the excitement and technology with them. The students should conduct activities like creating mission patches, assigning rank etc. This will help the student understand the history and significance of icons and insignia on civilization.

Applicable Potential NASA jobs:

- **Nutritionist**
- **Scientists**
- **Mechanical Engineers**
- **Biologists**
- **Medical Specialists**
- **Technicians**
- **Systems Engineers**
- **Electrical Engineers**
- **Chemists**
- **Physicists**
- **Mechanical Engineering Technology**

Please complete the following list and assign each person on the team to one job:

- **Commander** _____
- **Pilot** _____
- **Mission Specialist 1** _____
- **Mission Specialist 2** _____
- **Mission Specialist 3** _____
- **Arm/Boom Operator** _____
- **Mission Specialist 4** _____

Required Project Documentation:

1. Crew Member Jobs
2. Equipment Requirements
3. Astronaut Biographies
4. Hubble Telescope Data
5. Required Training and Preparation

Directions: Develop a mission profile using 3 basic tasks/objectives and then combine the tasks into an overall mission planning document. Use the boxes below on left for brainstorming and box on right for final approach.

--

--

Mission Objectives

Directions: Each student should understand all objectives of mission

Objective#	Description of Objective	Crew Member	Duration
1			
2			
3			
4			
5			
6			
7			
8			
9			

Written compilation of Mentor information by each student

Directions: Use complete sentences to write pertinent information about your role in the mission and what requirements were necessary to prepare for the mission or to be selected as a crew member. Each student will need enough knowledge to share the information with others and present in an educational and knowledge sharing fashion.

PROGRAM EVALUATION

NAME: _____

USE FULL SENTENCES to answer the following.

What activity/part did you like doing best during this program? Why?

What activity or part did you find most challenging or unique during this program? Why?

If you could modify this program what would you do differently to improve? Why?

What aspect of your work would you like to improve this year?

Did your team mates do their fair share of the work? If not, which ones did the most work? What did they do?

On a scale of 1 to 10, rank each of your team mates' efforts.

In the end, who was the leader? _____

Judges Rubric “STS-125 Jr. Mission Expert”

Utilizing National Science Standards and STEM approaches

General Knowledge

_____ Excellent 20 Pts.—Student has a mastery of the STS-125 mission objectives and has studied the role of his/her mentor during the mission. A clear understanding of the Mentor should be demonstrated and include biographical information, mission role and results of mission work at end of Flight. Student should be able to clearly communicate, speaking clearly and with good grammar. Any written instructions or presentations should be accurate and clearly written.

_____ Good 15 Pts. --- Student has a good understanding but has not mastered knowledge of the STS-125 mission objectives. Student has studied the role of his/her mentor during the mission, but is lacking significant detail about mission objectives. A less than clear understanding of the Mentor is demonstrated but includes biographical information, mission role and results of mission work at end of Flight. Student communicates well, but misses some elements important to speaking clearly and with good grammar. Written instructions or presentations are not as sharp or refined and lacks some element of originality.

_____ Fair 10 Pts. --- Student has not mastered the information about the Mentor and clearly demonstrates that a lack of research as precluded the understanding. The student misses the point of the significant science impact from the mission. The student cannot answer more difficult questions pertaining to the mission or Mentor. Presentations are poor and the student cannot clearly articulate information about the mission or Mentor. Good grammar and written skills are missing.

_____ Needs Work 5 Pts. --- The student has not done any substantial work or research and clearly lacks any understanding of the scientific impact of the mission. Student cannot answer questions about the mission or Mentor accurately. Presentations are generally poor, contain wrong information or do not reflect the overall goals of the program. Little to no effort has been expended by the student.

Completion of Work

_____ Excellent 30 Pts. --- Student completed all tasks assigned and had good attendance at events

_____ Fair 15 Pts. --- Student completed most tasks, but missed key events or other requirements.

_____ Needs Work 10 Pts. --- Student completed few tasks, missed substantial key events/objectives.

Technology Usage

_____ Excellent 30 Pts. --- Student utilized internet, power points, software and other sources very well.

_____ Fair 15 Pts. --- Student use of internet was present, but did not use power point or other software

_____ Needs Work 10 Pts. --- Student used some materials to support work, but extremely limited

_____ **Total Points**

Additional Information:

www.nasa.gov

www.spaceportindiana.com