

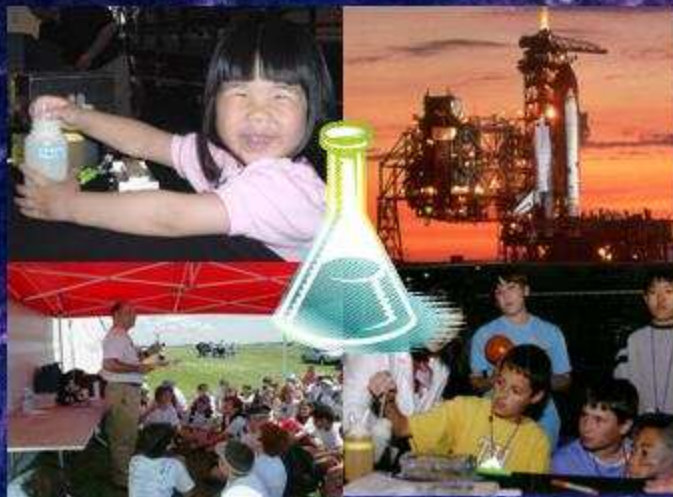


**SPACE OUTREACH**

**Mission**

**Zero-G**

Student-Run  
Ground and  
Space Experiments



Presentation to Ms. Peggy Steffen  
Director of NASA Explorer Schools  
NASA Headquarters  
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Brian Ewenson  
ITA, Inc.  
703-998-8358  
Bewenson@comcast.net

Valerie Cassanto  
Space Outreach  
410-349-4935  
Vcassanto@comcast.net

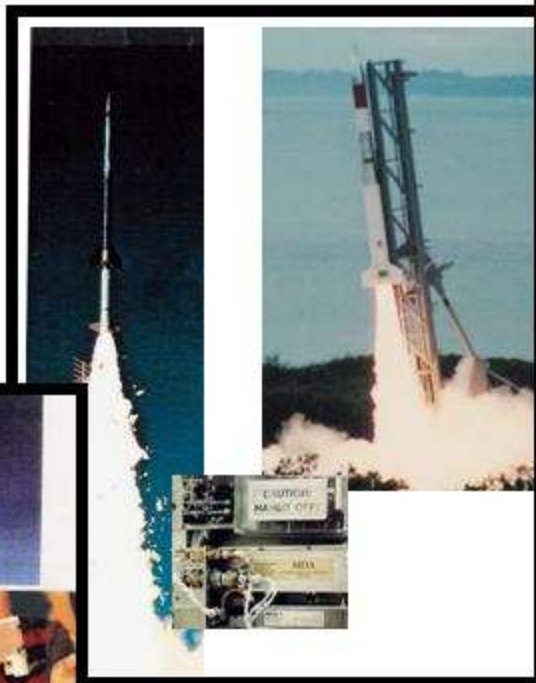
# ITA's Track Record of Microgravity Missions Spans 20 Years

**SPACE OUTREACH**



**4 Low-g Aircraft Flights**

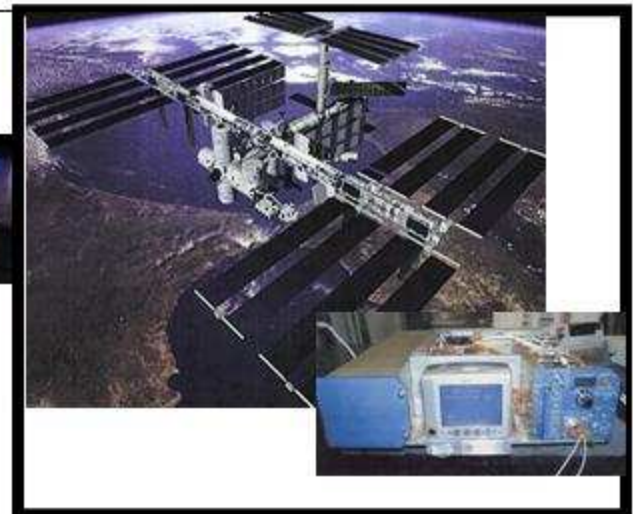
Early 1980's



**7 Sounding Rocket Flights**



**9 Space Shuttle Missions**



**ISS Missions**



**1 Shuttle/Mir Mission**

2002

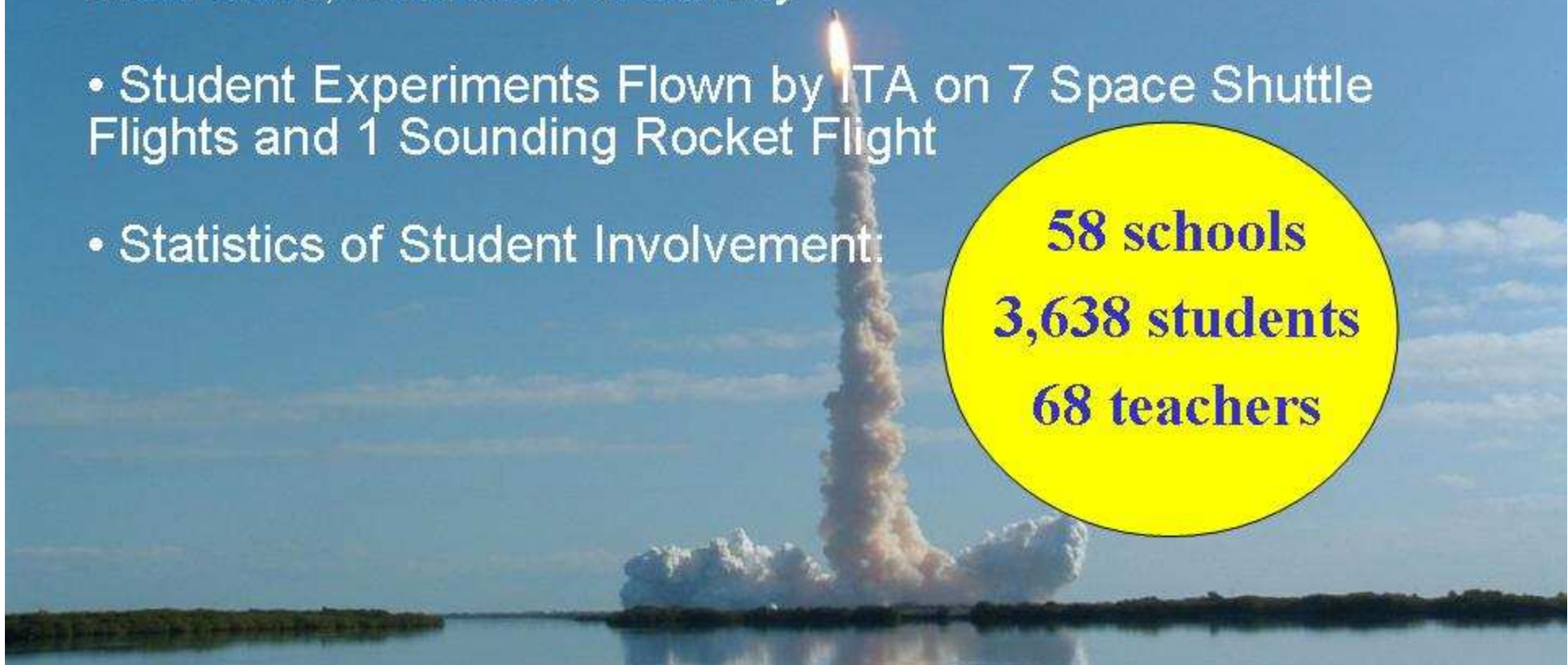
## Accomplishments

- Thousands of students have been involved in designing and flying their own experiments “in Space” through ITA.
- Young people have changed career paths, increased motivation, increased creativity
- Student Experiments Flown by ITA on 7 Space Shuttle Flights and 1 Sounding Rocket Flight
- Statistics of Student Involvement:

**58 schools**

**3,638 students**

**68 teachers**





# Selected ITA Student Experiments flown



• Flight STS-52	Columbine Seed Generation	Wakulla Middle School, FL
• Flight STS-52	Larval Development of Brine Shrimp	Titusville High School, FL
• Flight STS-52	Clotting Fibrinogen with a Snake	
•	Venom Enzyme	TC Williams/Dunbar High Schools, VA
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• Flight STS-56	Zoology and Botany Experiments	Stewart & Whitcomb Elementaries
• Flight STS-56	Mushroom Mycelial Growth	Unionville High School, PA
• Flight STS-56	Heart Cells in Culture	The Peddie School, NJ
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• Flight STS-67	Seeds in Space	Brandywine Wallace Elementary, PA
• Flight STS-69	Vegetable Seeds	Brandywine Wallace Elementary, PA
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• Flight STS-80	Germination of California Poppy Seeds	McGaugh Elementary School, CA
• Flight STS-80	Metal Durability	Mount Nittany Middle School, PA
• Flight STS-80	Gas Diffusion	Park Forest/Nittany Middle Schools, PA
• Flight STS-80	Gelatin and Base Diffusion	Park Forest Middle School, PA
• Flight STS-80	Biosurfactants	Southern High School, MD
• Flight STS-80	Lead Iodide	Glenbrook High School, IL
• Flight STS-80	Larval Development of Artemia Salina	Titusville High School, FL
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• Flight STS-95	Effect of Gibberlic Acid on the Growth	
•	Of a Radish Seed	Vero Beach High School, FL
• Flight STS-95	Effect of Microgravity on the Develop-	
•	ment of a Nematode	Northeast High School
• Flight STS-95	Strawberry Seed Germination	Manatee County Schools, FL
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• Flight STS-107	Growth of Bacterial Biofilm on Surfaces	Tel Aviv University
• Flight STS-107	Inorganic Crystal Growth	Texas, New Mexico School w LMCO
• Flight STS-107	Tin Crystal Formation	Pembroke Pines Charter Middle School, FL
• Flight STS-107	Bacteria with Expression of Antibiotic Resistance	Milton Academy, MA



**“Microgravity Space Experiments” Hands-On Demonstration Booth at Space Day 2004  
by Space Outreach and ITA**

**SPACE OUTREACH**



**Space  
Day**

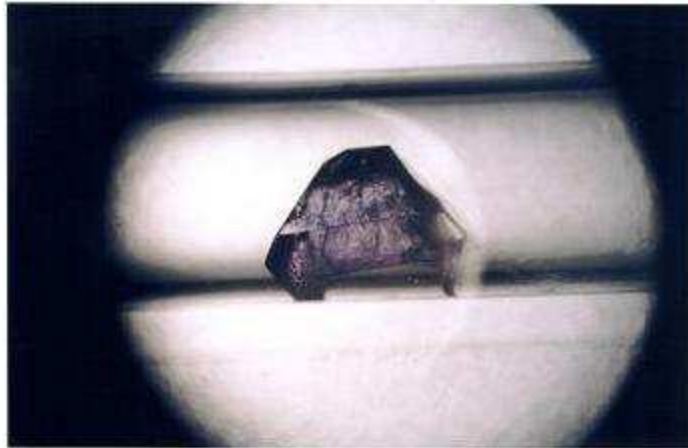


**Blazing  
Galactic  
Trails**

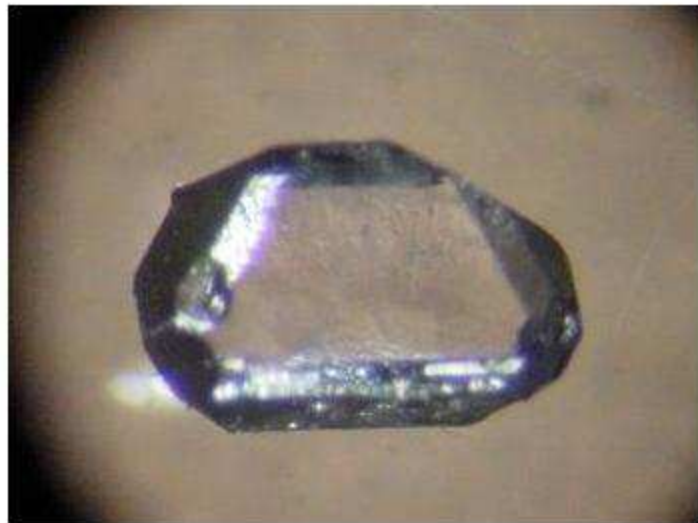
*Photos of children practicing Ground Control Experiments at the Udvar-Hazy Center Air and Space Museum, Chantilly, Virginia, May 6, 2004*



# Inorganic Crystal Growth Student Experiment Sponsored by the Lockheed Space Operations Corporation, Houston for Area Schools



Ground Control Crystal



Space Grown Crystal



Dr. Bob Mohler (Lockheed) Performing a Demonstration of Inorganic Crystal Growth for Area Schools Students

## Students Changed Career Plans Because of STS-52 Experiments "Florida Today", November 2, 1992

### Students to study shrimp that flew aboard Columbia

By Stephanie Reitz  
FLORIDA TODAY

At least 11 Titusville High students will be more anxious than usual to return to school today, ready to focus on a piece of research history.

The objects of their interest: 11 tiny brine shrimp, veteran space travelers and a possible indicator of whether such critters can grow in microgravity.

One hitch: Most came back dead, having spent their short lives in tiny test tubes aboard Shuttle Columbia, which landed Sunday. One lived but has not hatched.

But the important thing is not whether they survived; students will study how much the creatures ate.

The shrimp's muscles are high in protein, making it a potential food source for future space dwellers. Their protein-rich muscles build up when they resist gravity while swimming; without gravity, a smaller appetite might indicate less muscle growth, meaning less protein and reduced value as a food source.

That and other questions should be reviewed in the next few weeks by the Titusville High students, who logged more than 2,000 hours of research since beginning the project in June.

"We wanted to get a feel for science as it is in the real world," said Ellen Lin, a junior.

In addition to Lin, students Anna Hilton, Jonathan Jarvis, Tiffany Thunker, Esma Hatoum, Sheila Sachdev, Jay Tulley, David Lin, Bobby Thornburg, James Rogers and Tami Knatz worked on the project.

The unhatched egg could lead to separate research, chemistry teach-

#### SPACE

department, have been working with the students throughout the project.

"We didn't expect them to live throughout the mission, but having that unhatched egg might turn out to be a very interesting, pleasant surprise," McCord said.

The students' space experiment was made possible by Spaceport Florida Authority, a Cocoa Beach-based development board. Their experiment rode in slots donated by Instrumentation Technology Associates Inc., which also gave space to schools in Pennsylvania, New Jersey and Washington, D.C.

"We've gotten some really good data, and hopefully the students will get good results on their research," ITA president John Cassanto said.

Another Titusville High experiment will be flown in ITA-donated space when Shuttle Discovery is launched in March, he said.

The experiment has had some unexpected side results: Some students have changed their career plans, developing a strong interest in the biological sciences, sophomore Bobby Thornburg said.

Thornburg often hurried from swim practice to the research group's meetings. Later, the tiny brine shrimp — smaller than an eyelash — could be found in test tubes in one corner of the family's Titusville kitchen, said his father, Dick Thornburg.

Many unwittingly gave their short lives for the research, receiving burials at sea with a quick flush.

"Sometimes if things weren't going quite well, you'd catch a decent odor out of it while walking

The experiment has had some unexpected side results: Some students have changed their career plans, developing a strong interest in the biological sciences, sophomore Bobby Thornburg said.

## Valerie Cassanto

- Over 20 years experience in commercialization of space and microgravity payloads.
- Organized and loaded payloads on Shuttle, rocket, and ISS missions.
- More than 18 years involvement in hands-on space education programs for elementary to University level students.
- Helped hundreds of students to develop and fly their own space experiments on the Shuttle and rockets.
- Former Director of Logistics for the International Space University (ISU), ITA, Inc., and founded a non-profit organization dedicated to motivating students in space activities, Space Outreach
- Organized international space symposia
- Published and presented over 15 papers on hands-on space education
- Member of the International Astronautical Federation (IAF) education and outreach committee.

