

The background is a deep purple and blue space scene. In the top left is a large planet with horizontal stripes. To its right is a smaller planet with a ring. In the bottom left, an astronaut in a white suit floats with a coiled tether. In the bottom right is a large, cratered moon. The sky is filled with numerous small white stars and larger, four-pointed starbursts. Abstract, flowing shapes in shades of purple and blue are scattered throughout the background.

Space Exploration Awareness Among High School Students

The background is a deep purple and blue space scene. In the top left, there's a large planet with horizontal stripes. Below it is a smaller planet with a ring. In the top right, an astronaut in a white suit floats, holding a long, thin, looping rope. In the bottom right, there's a large, cratered moon. The background is filled with numerous small white stars and larger, four-pointed starburst shapes. There are also some soft, wavy, light blue and purple shapes that look like nebulae or gas clouds.

1.

Background/Literature Review



\$23.3 BILLION

NASA 2021 budget

\$71.2 BILLION

Generated in total direct economic output

17,387

Permanent jobs supported by NASA

\$7.7 BILLION

Federal, state, and local tax revenues

The State Of NASA's Budget As Pence Seeks New Moon Landing

NASA's budget as a share of the U.S. federal budget from 1958 to 2017



@StatistaCharts

Sources: The Guardian, Office of Management and Budget

statista

NASA Budget Compared to the US Federal Budget From 1950 to 2017

NASA Spinoffs

- ★ "Public products and processes that are developed with NASA technology, funding, or expertise, that provide a benefit to American lives beyond dollars and jobs"



Future Growth

Table 9. 2040 Projections of the Size and Composition of the Space Economy

Institution	Year	2016 Space Economy	Future Space Economy	Compound Annual Rate of Growth
UBS	2040	\$340 billion ^a	\$926 billion	4.3%
Morgan Stanley	2040	\$339 billion ^a	\$1.1 trillion	4.9%
U.S. Chamber of Commerce	2040	\$383.5 billion ^b	\$1.5 trillion	6%
Bank of America	2045	\$339 billion ^a	\$2.7 trillion	9%
Goldman Sachs	~2040	\$340 billion ^c	multi-trillion \$'s	9.5% ^d

Previous surveys

- Although 72% of the Americans, 70% of democrats, and 59% of republicans support space exploration, only 7% of people are attentive

Research Gap

- No information on high school students' opinions
- They are the future of the country
- There is no information on people's degree of knowledge concerning space exploration spinoffs
- The location of the survey -- Bridgeville, PA -- is also a gap

Guiding research question:



**To what extent are the students
enrolled in a high school located in
Bridgeville, PA aware of NASA's
current economic situation and their
contributions to the general public?**



2. Methods



Overview

Survey

- ★ Time-efficient
- ★ Resource-efficient
- ★ Larger data quantity
- ★ Quantitative analysis

Interview

- ★ Smaller data quantity
- ★ Qualitative analysis of every single response
- ★ More detailed

Student-journaling

- ★ Even smaller data quantity
- ★ Time-inefficient
- ★ Interviews are part of this method
- ★ More detailed

Google Form Survey Design

- Two questions
 - Grade
 - Age

- Four questions
 - Two about NASA budget
 - Revenue
 - employs

Personal Information

general space exploration

Economic knowledge

Personal Impact

- Two questions
 - Self-given rating
 - USA as a leader.

- Six questions
 - Priorities
 - Benefits
 - Personal Impact

Quantitative Analysis Methods

- Outliers
- Mean
- Median
- Standard Deviation
- Percent Error
- R-value

1. Which of the following best describes how closely you follow national and international achievements in the field of space exploration? *

	0	1	2	3	4	5	6	7	8	9	10	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Always

10. How many NASA spin-offs do you think exist?
(They have been recorded since 1976).

Please answer in **numeric format**.

Short answer text

.....

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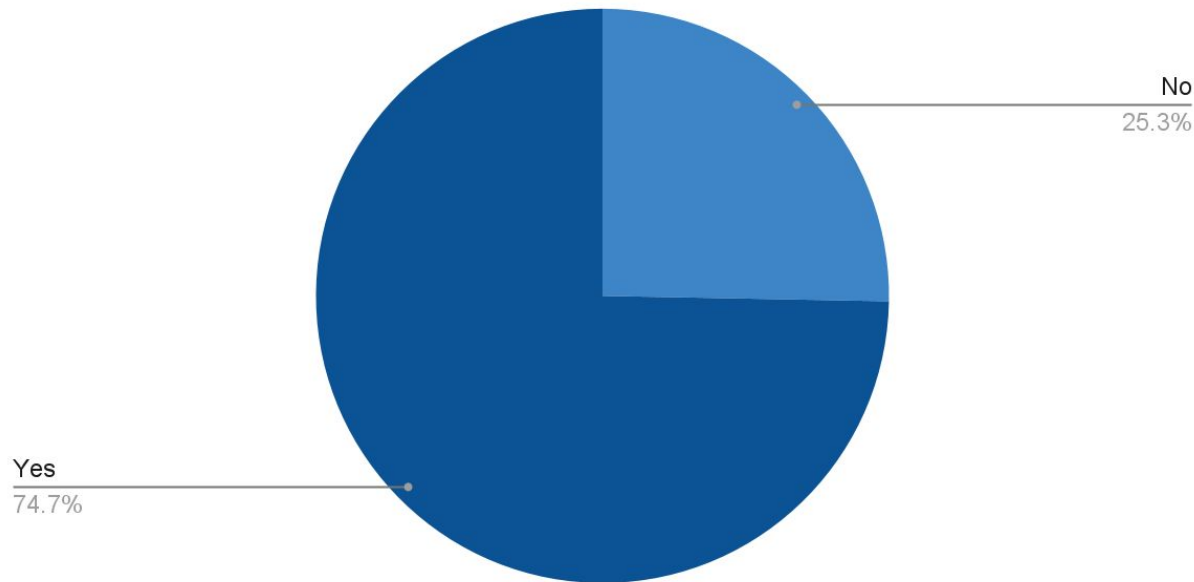
3. Data and Analysis

Spinoff Questions

- 28.9% believe space exploration-based technology every day while 71.1% believe that it once a day or less
- When given 15 space exploration spinoffs, 8 of the spinoffs were chosen 90% or more
 - Some of them are commonly used objects such as phone cameras and athletic shoes.
- After this question, when the respondents were asked how many of these they knew of prior to taking the survey and the mean was 2.81.

Is Space Exploration Important?

Responses When Asked if the USA Should be a Leader in Space Exploration



Student Estimate Questions

NASA Employment

- Mean estimate: 9,187
- Real answer: 17,387
- Standard deviation: over 12,000

NASA Revenue

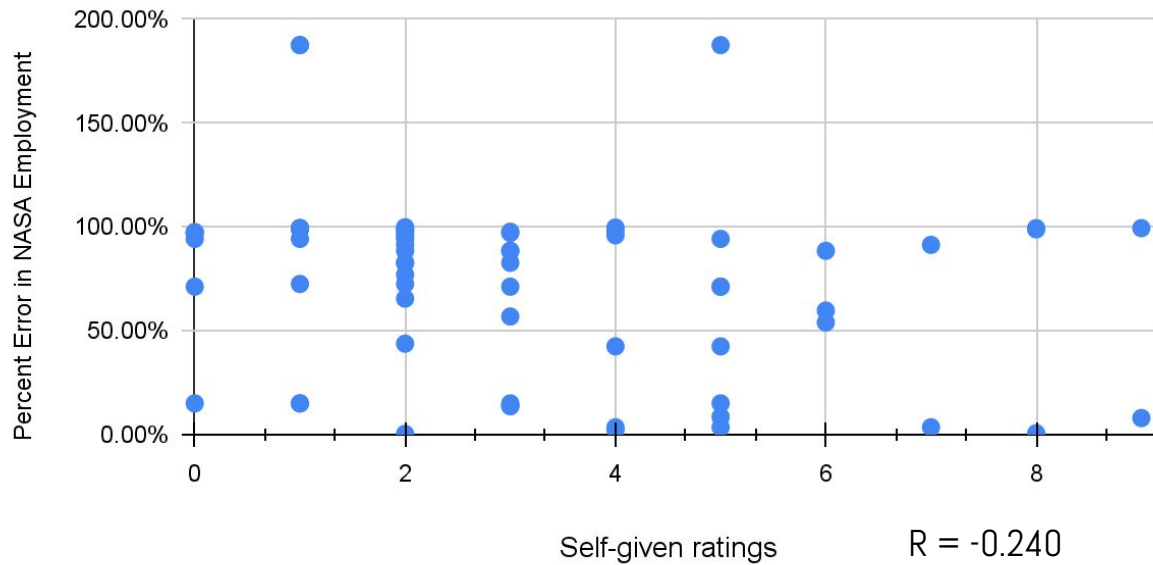
- Median estimate: \$31-40 billion
- Real answer: \$71.2 billion
- 83% chose option below \$71 billion

NASA spinoffs

- Mean Estimate: 581
- Actual Answer: over 2000
- Standard deviation: Over 2000

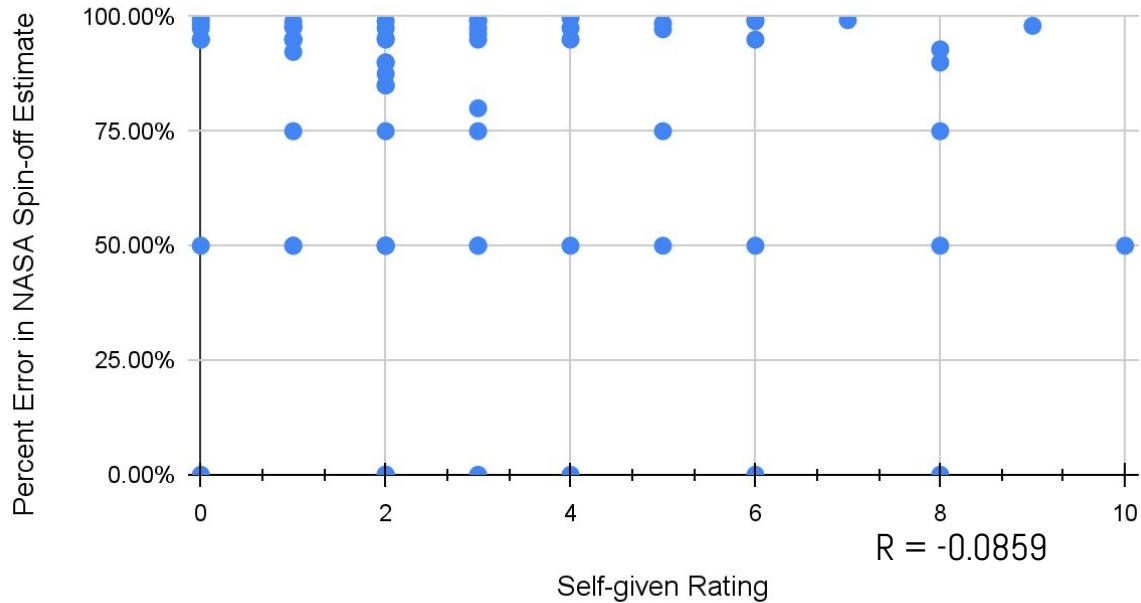
NASA Employment

Self-given Ratings vs. Percent Error in NASA Employment Estimate



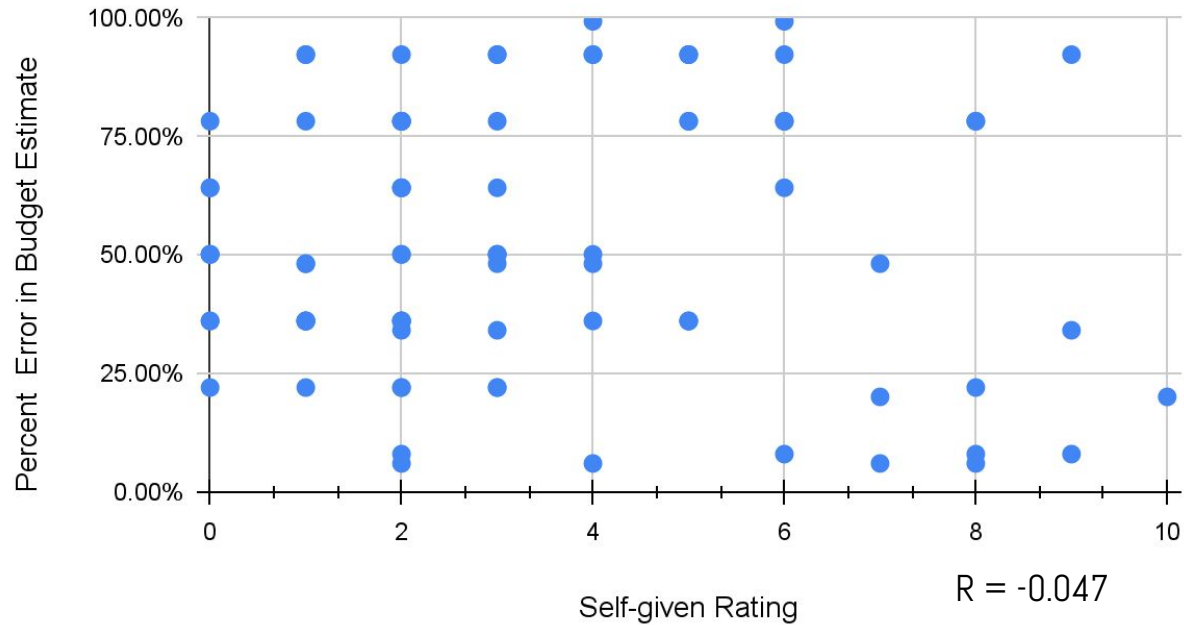
NASA spinoffs

Self-given Rating vs. Percent Error in NASA Spin-off Estimate



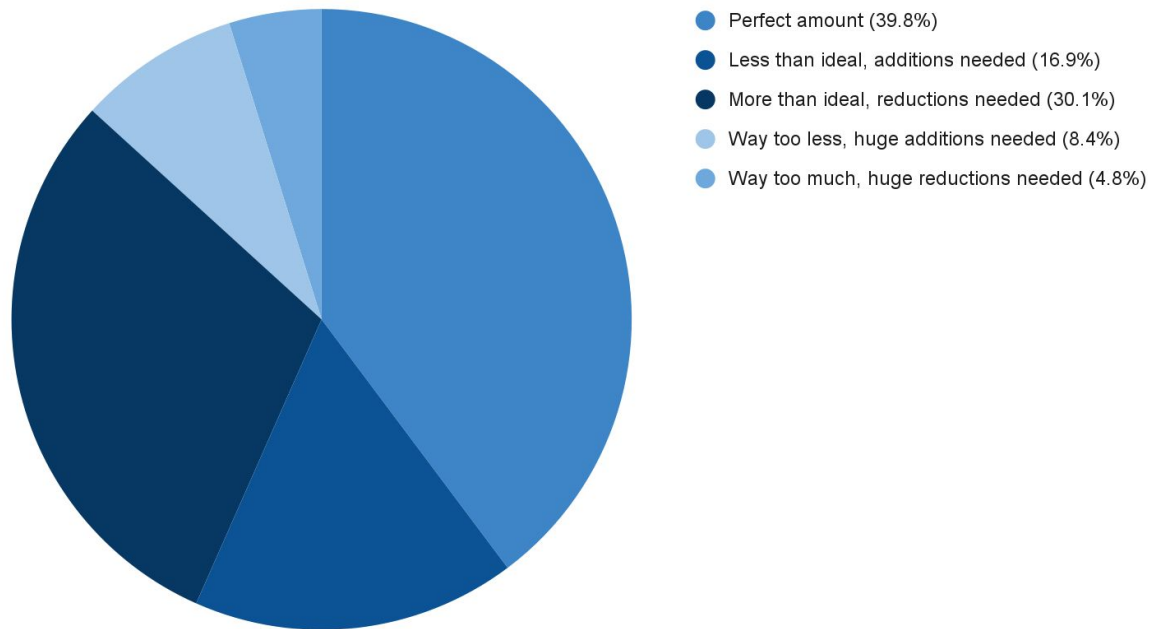
NASA Revenue

Self-given Rating vs. Percent Error in Revenue Estimate



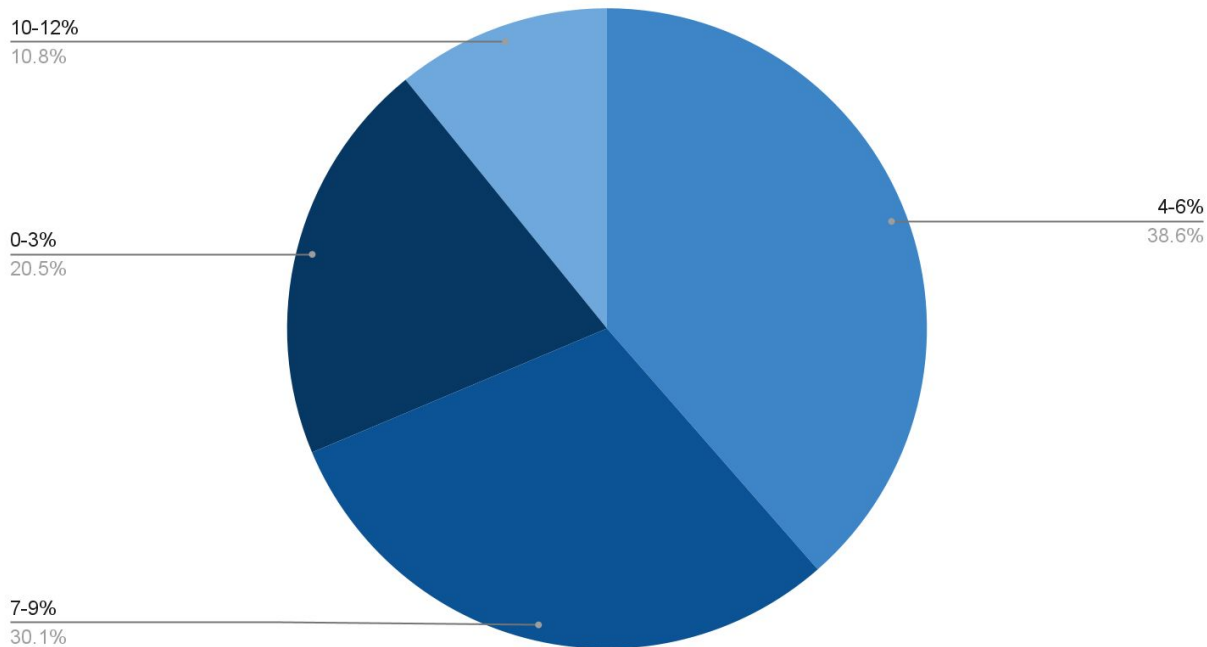
NASA Budget

Student Opinions on the Federal Budget of NASA



NASA BUDGET

Student Estimates of the NASA Budget as a Percent of the Federal Budget



4. **Limitations and Implications**



Limitations

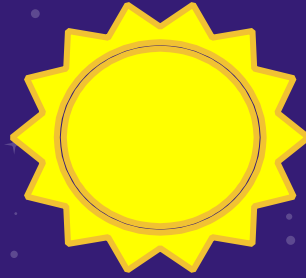
- Surveys are inflexible
 - Ranking six benefits of NASA
- Lack of depth
- Even sampling of the population is difficult
- Social Desirability Bias

Implication

- Result can encourage NASA to pursue awareness programs
- Same research can be conducted with different methods
 - Interviewing/Student journaling
 - Different ages/grades

Conclusion

- The high number of outliers, high standard deviation, low r-values, and high percent errors show a lack of awareness of space exploration and lack of awareness of one's own knowledge



Thank You!

ANY QUESTIONS?



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