



# Mathematics Education Standards “Quilt”: *Formative Evaluation*

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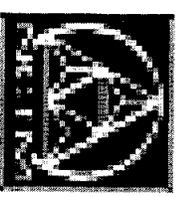
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# History

- NASA recognized potential for using space science to teach mathematics (real-life applications)
- Many NASA education programs began developing math curriculum
- Beta version of the Mathematics “Quilt” developed in 2001
  - Created using NCTM’s “Principles and Standards for School Mathematics” as an organizer
  - Review from Authoring Institution completed by:  
**Dr. Joan Ferrini-Mundy** (*Chair of the Writing Committee for Principles and Practices of School Mathematics*)
- Series of formative evaluations began





# Study Rationale

- Continued evaluation of Quilt assumptions
  - Need to search by standard
  - Organizational framework
- Evaluation of lesson quality
  - Based on Quality Assurance Rubrics (Rich Alvidrez, JPL Education Office)
- Accuracy and verification of lesson placements on Quilt
  - Assessment of consistency of standards alignment in education community
  - Assessment of methodology for lesson placement on Quilt
    - Based on content and thematic descriptors
    - Based on grade level rubrics
    - Based on statistical consensus



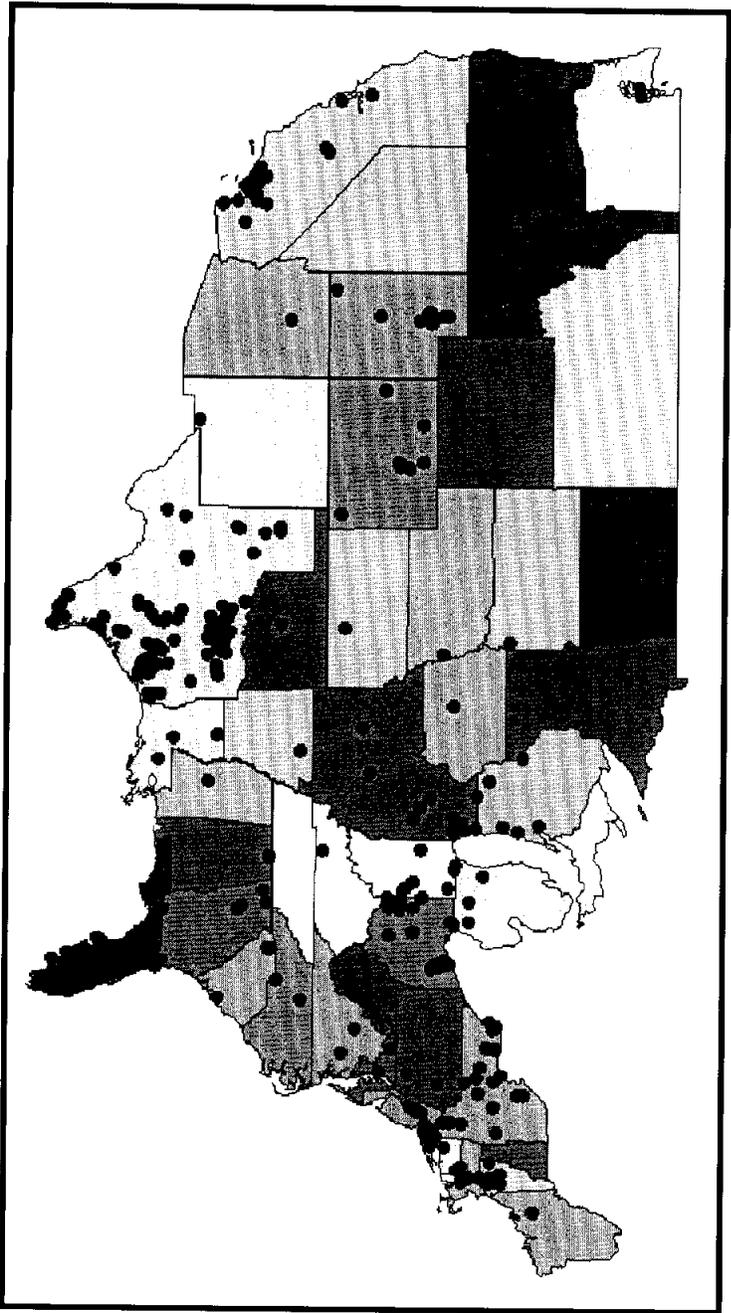
# Methodology

- **Formative Evaluation**
- **Method**
  - Educators contacted by various means soliciting volunteers
    - Email sent using various listserves and on-line education bulletin boards
    - Email sent to the Presidents of all States' Mathematics Associations asking that they distribute information
    - Invitation extended to members of Georgia Council of Teachers of Mathematics
    - Information booth at CAMT, 2003
  - Certificate of participation offered as incentive
  - Five educators per lesson
  - Follow up survey and telephone interviews
  - Qualitative and Quantitative components



# Demographics

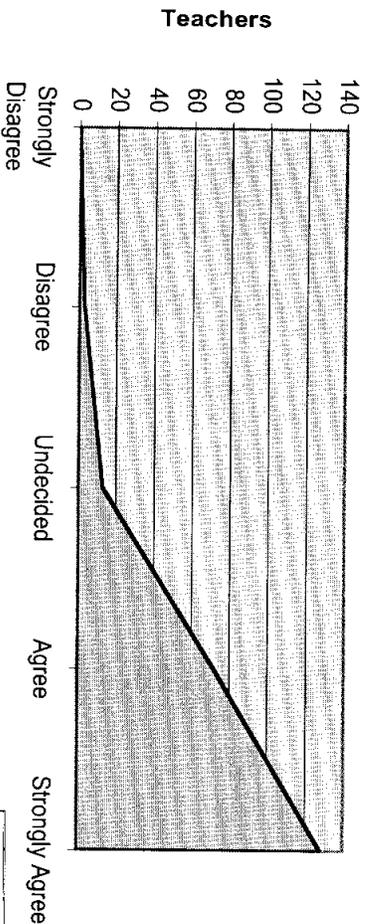
- 195 educators from 42 states enrolled, receiving one of 68 proposed lessons





# Quilt Validation- Results

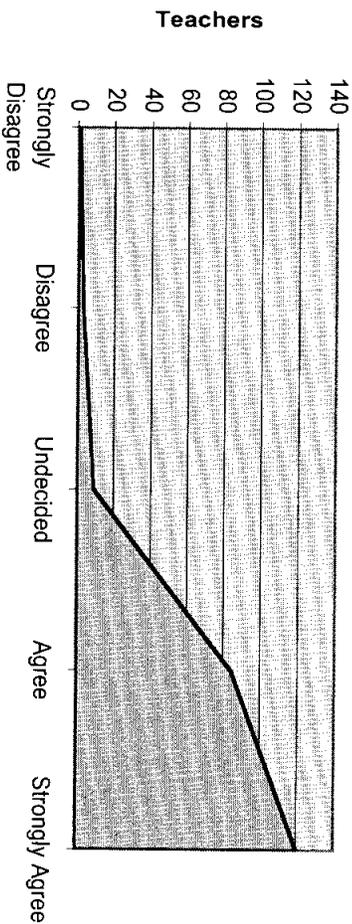
It is helpful to have the capacity to search for NASA instructional lessons by mathematics educational standard.



Math educators do have a need to search for educational materials by educational standard

*"I don't use NASA lessons, largely because I haven't been able to easily find their standards alignment. Perhaps this will help!"*

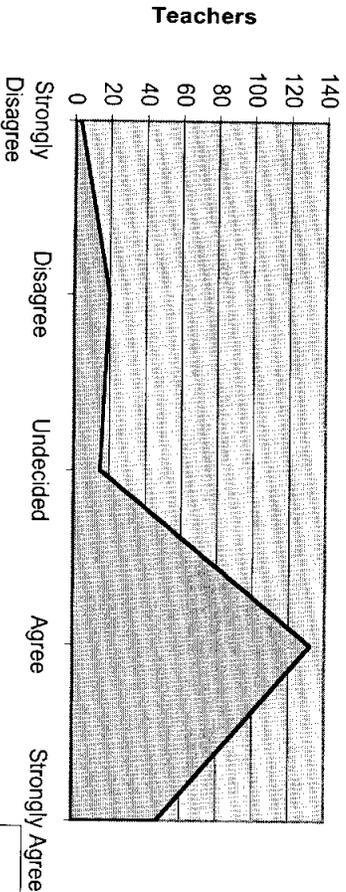
The creation of the Mathematics standards quilt would facilitate the use of NASA teaching materials in mathematics classrooms.





# State and National Standards Dichotomy

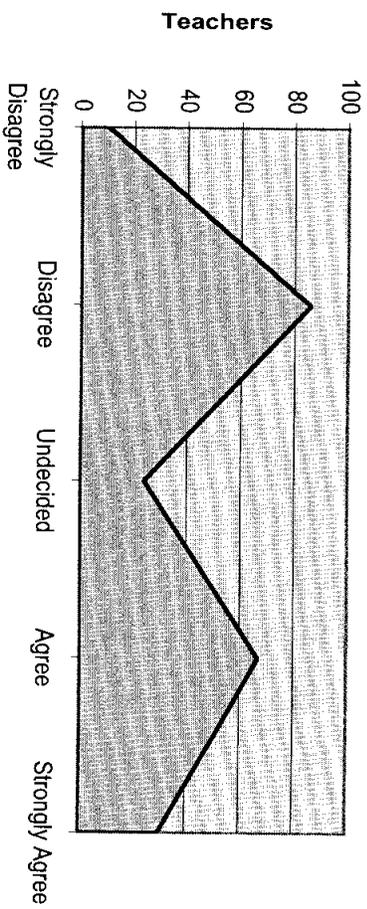
I was able to easily correlate the national mathematics standards displayed in the quilt with my state and/or district standards.



*"I would use them anyway, but it would be nice if the lessons were correlated/aligned with our state (CA) standards, since that is the big push these days."*

Many would prefer alignment to state standards rather than the national standards.

The Mathematics Education Standards Matrix would be of more value if it contained my state's standards rather than the national.



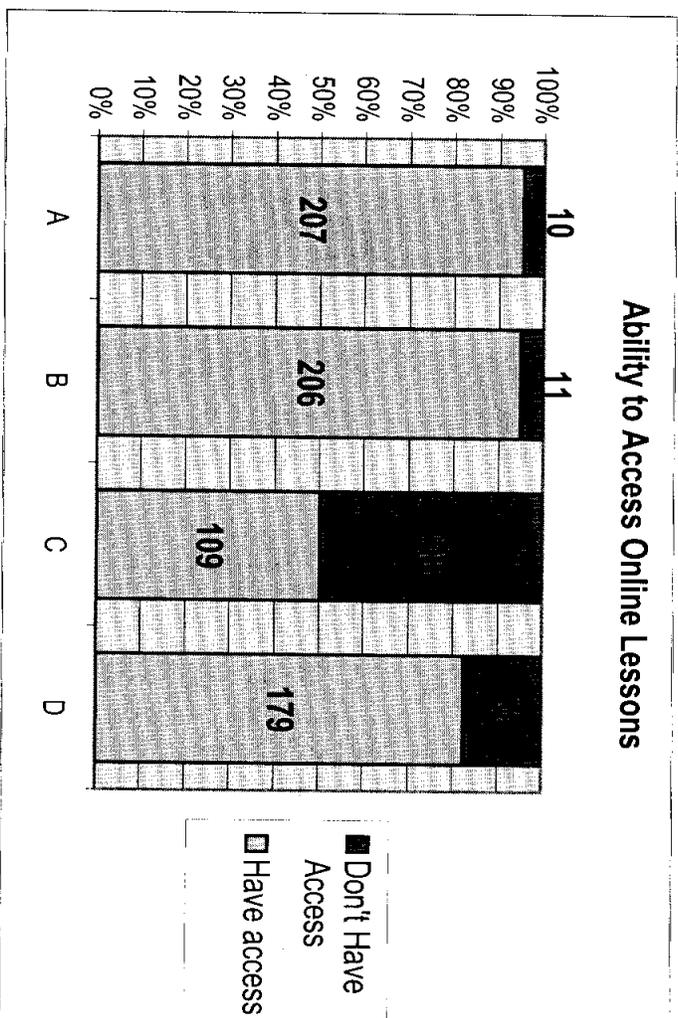


# Access to Online Materials

Please check all that apply to your teaching environment:

- A- I am personally able to access online materials from my home that I can then print off and distribute in hard copy to my students.
- B- I am able to access online materials from my place of work that I can then print and distribute in hard copy to my students.
- C- My students are able to personally access online materials from their homes which they can then print and/or complete.
- D- I have the ability within my school for my students to access computers for completion of interactive online activities.

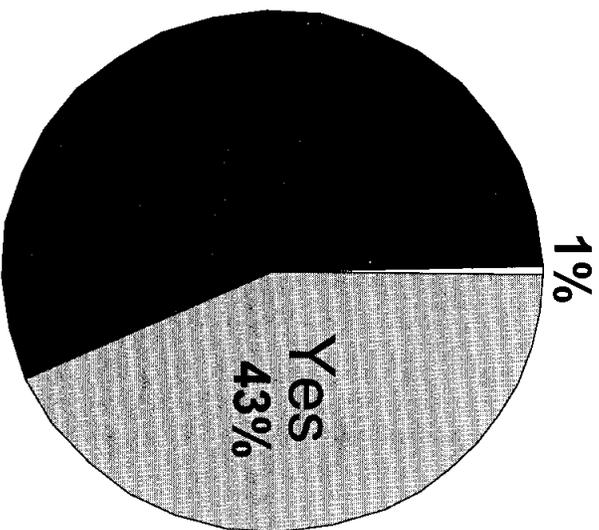
There still exist many technical barriers in schools that limit the use of on-line materials.





# Current use of NASA Materials

Have you previously used NASA data or teaching materials to teach mathematics?



Those who had not used NASA materials gave the following reasons:

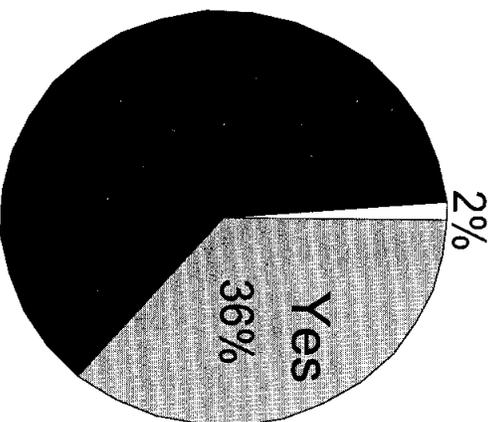
- Not aware of NASA materials
- Never associated “NASA” with “math”
- Couldn’t see how to fit materials into their curriculum

*“I didn’t realize that NASA had resources for the classroom teacher.”*



# Barriers to Lesson Use-Classroom

**Are there barriers within NASA resources that prevent, limit, or delay your use of our Materials?**

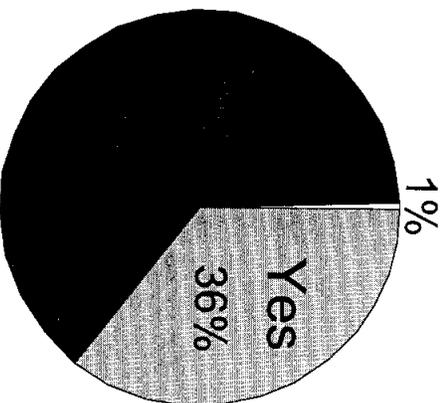


- **Mandated curriculum requirements**
  - *“When you can convince my state and school system to back off in the curriculum content requirements so that I can work on extended lessons and real-world applications, then I will feel free to incorporate more materials from NASA.”*
- **Lesson not designed for math teachers**
  - *“There are concepts/vocabulary in the lesson plan that I read that I’m not familiar with. I would want to research these before presenting to a class. I would like to have scientific vocabulary explained with more background info.”*
- **Unavailable resources**
  - *“Previously I wanted to use them [NASA resources] but was unable to get the technology required for the lesson.”*



# Barriers to Lesson Use-NASA

Are there barriers in your district, school or area that limits/prevents NASA resource usage?



- **Complexity of NASA's Website**
  - *"I find it difficult to locate lessons. There are so many different home pages within NASA that I get lost. If possible, it would be easier to have one main homepage for educators where all the departments could be listed with a link to their individual homepage"*
- **Lack of Publicity**
  - *"I am not sure teachers are aware of these materials."*
  - *"More information about its existence needs to be distributed, especially to listserves that connect math teachers within my state."*



# Results- Lesson Quality

- 11. Can this lesson be applied effectively in practice?
- 12. Would it be easy for teachers to adopt this lesson?
- 13. How well did your instructional lesson align with state and national standards?

