Recommendations for Improving Teaching and Learning in Atmospheric Science Through Research

Dawn Kopacz

University of Nebraska – Lincoln

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Wendilyn Flynn – University of Northern Colorado, Lindsay Maudlin – Auburn University, Zachary Handlos - Georgia Institute of Technology, Swarndeep Gill – California University of Pennsylvania, Adam Hirsch – University of Missouri

Motivation

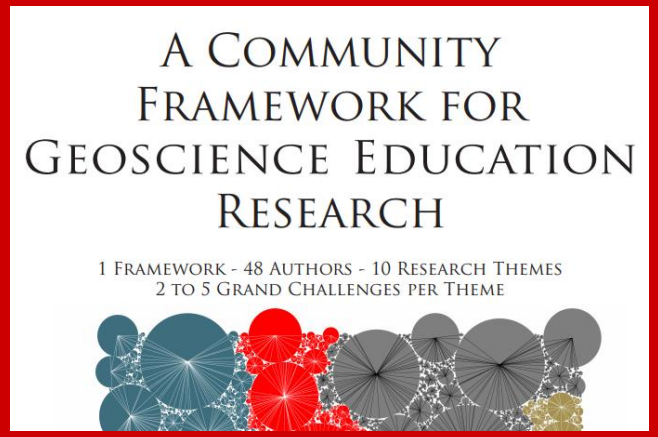
- Geoscience education research formalized over fifteen years ago; importance recognized by National Science Foundation (Manduca et al. 2003; National Research Council 2012)
- Suggestions to improve participation in atmospheric science education research (ASER) by members of atmospheric science community proposed over a decade ago (Charlevoix 2008)
- Literature assessing and promoting pedagogy in atmospheric sciences has been sparse compared to other geoscience disciplines (Wilson 2016)

Recent History

AMS Short Course: Atmospheric Science Education Research: A Beginner's Guide **January 7th, 2018**

Determined needs and potential research questions:

- Collaborators to increase sample sizes? Where to publish? Is ASER valued?



Project to identify goals for geoscience education research that will be achievable within ten years and will have significant impact on geoscience education teaching and learning – called **Grand Challenges** (St. John 2018)

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Grand Challenge 5: How do we broaden the participation of faculty who are engaged in educational research in environmental sciences, atmospheric sciences, ocean sciences and climate sciences and encourage implementation of research-based instruction?

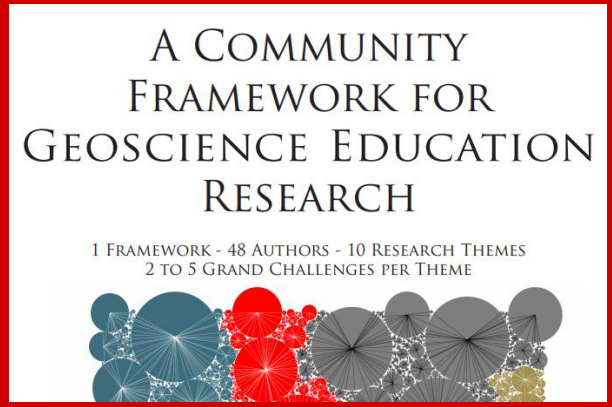
Surveyed community to determine…

1. The number of community members involved in ASER;

2. Whether ASER is valued within the community, and if so, to what extent;

3. Potential barriers to involvement in ASER; and

4. Resources necessary to encourage involvement in ASER



Demographics

Gender	% Response
Male	57
Female	41

Age	%
18-24	3
25-34	17
35-44	28
45-54	18
55-64	17
> 64	16

Employment	%
Educator	64
Graduate Student	4
Post doc	4
Research Scientist	13
Administration	2
Other	13

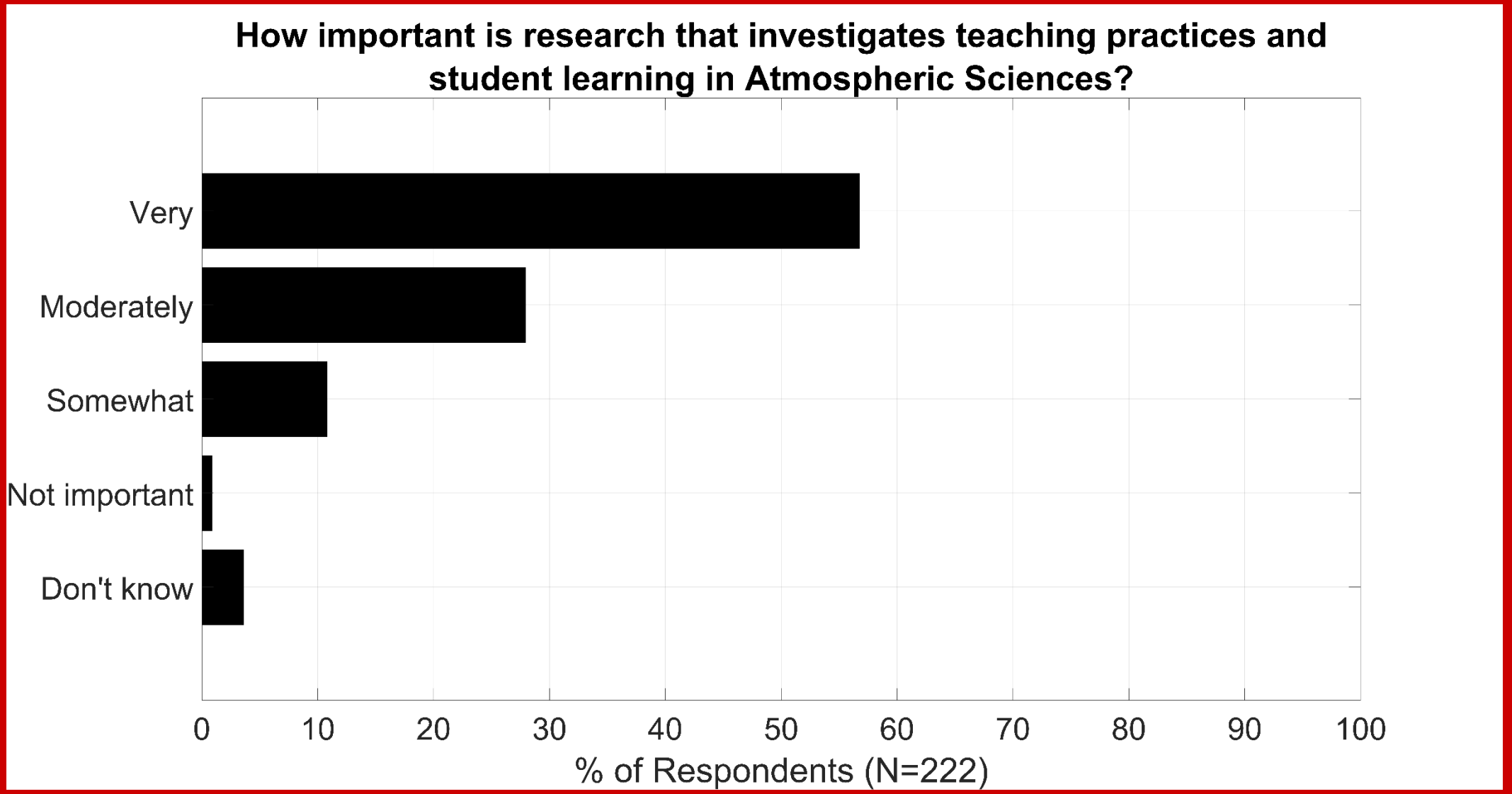
223 total respondents

→ Smaller N values for 20 questions asked of educators only

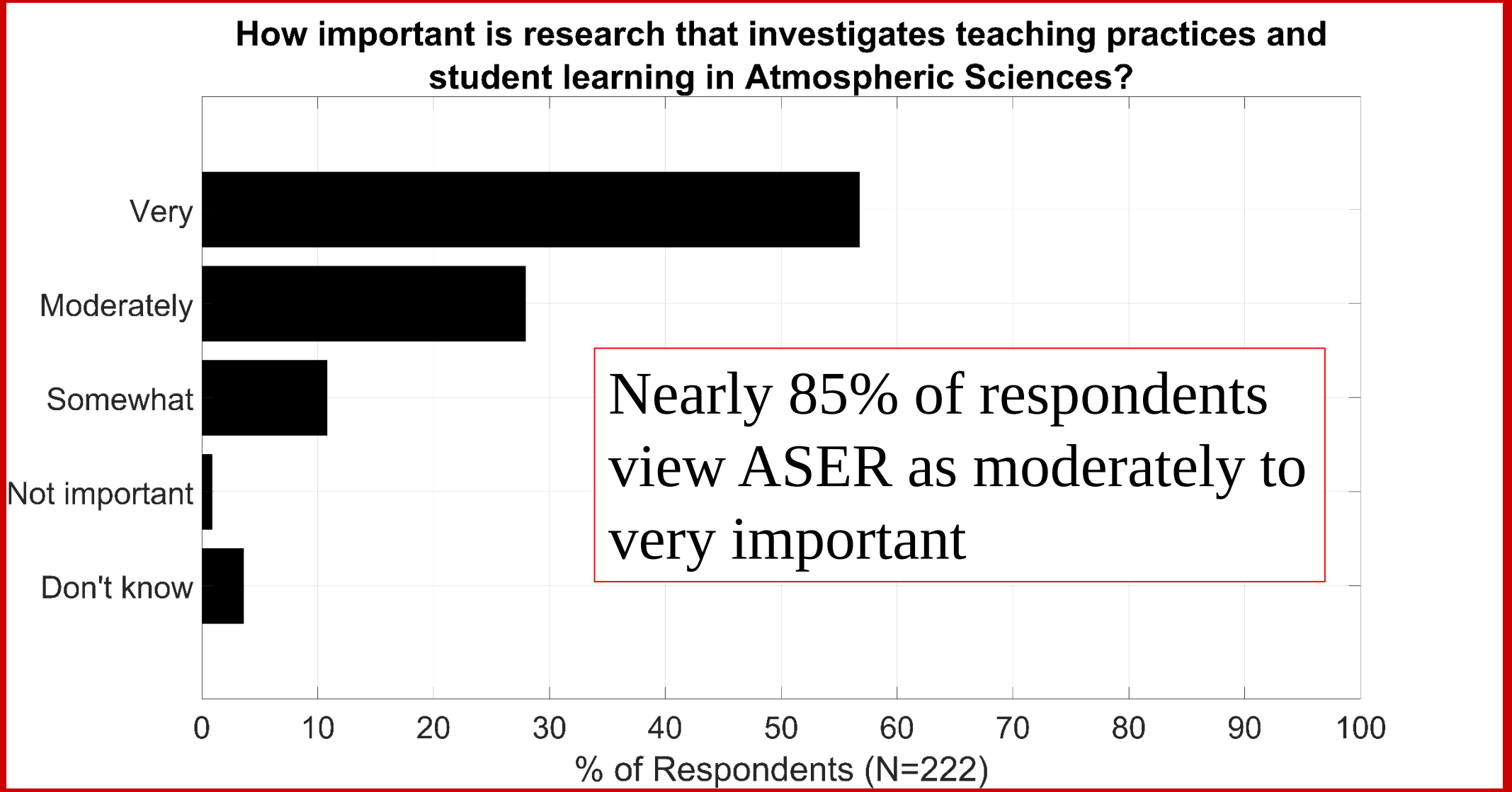
Majority of respondents were professionals in academia which is not surprising given the focus of the survey

13% in “Other” category (e.g., Science Program Directors, Retirees, Operational Meteorologists, High School teachers, and Computer scientists)

Importance of ASER

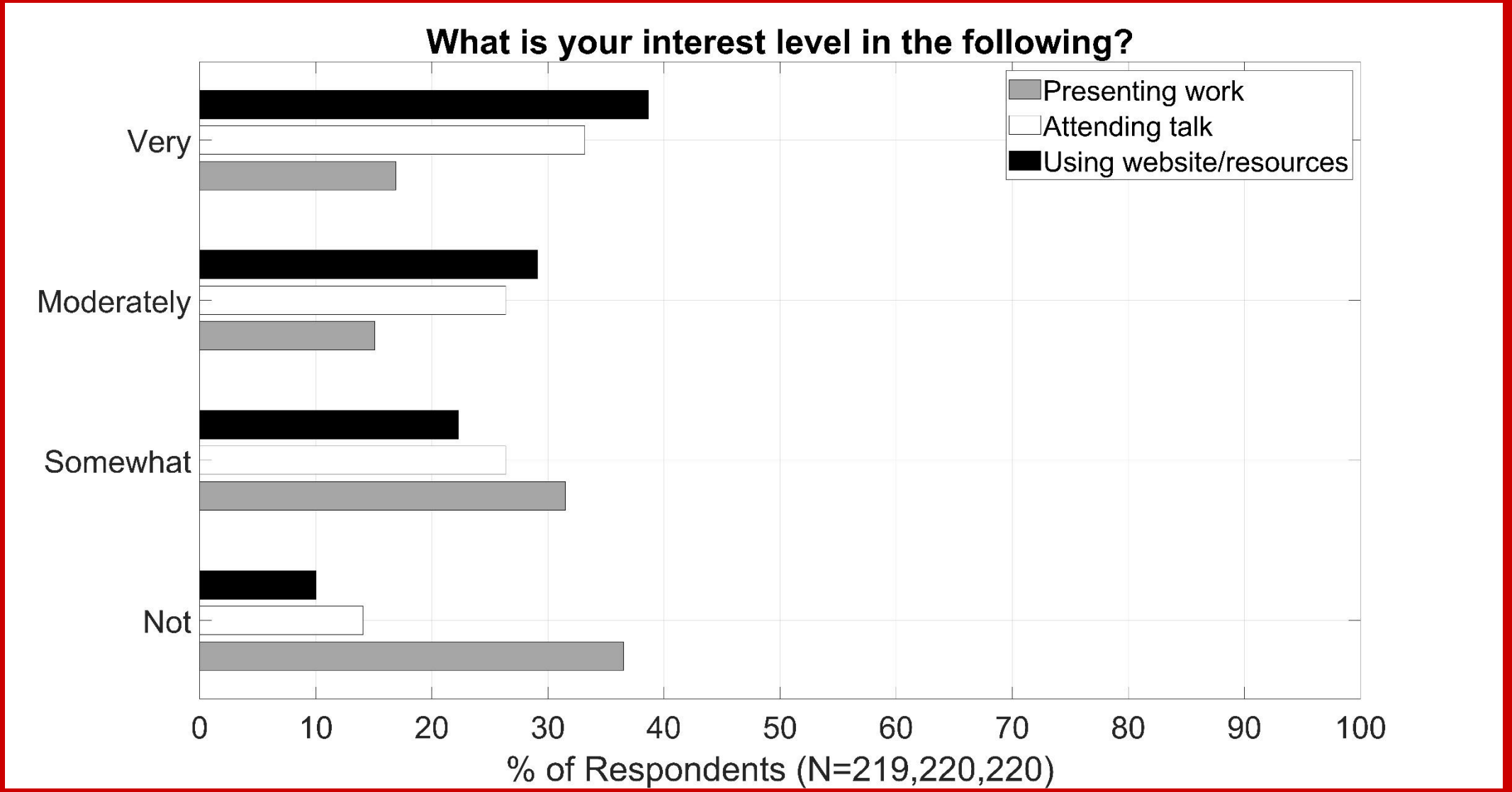


Importance of ASER



Nearly 85% of respondents view ASER as moderately to very important

Interest in ASER activities



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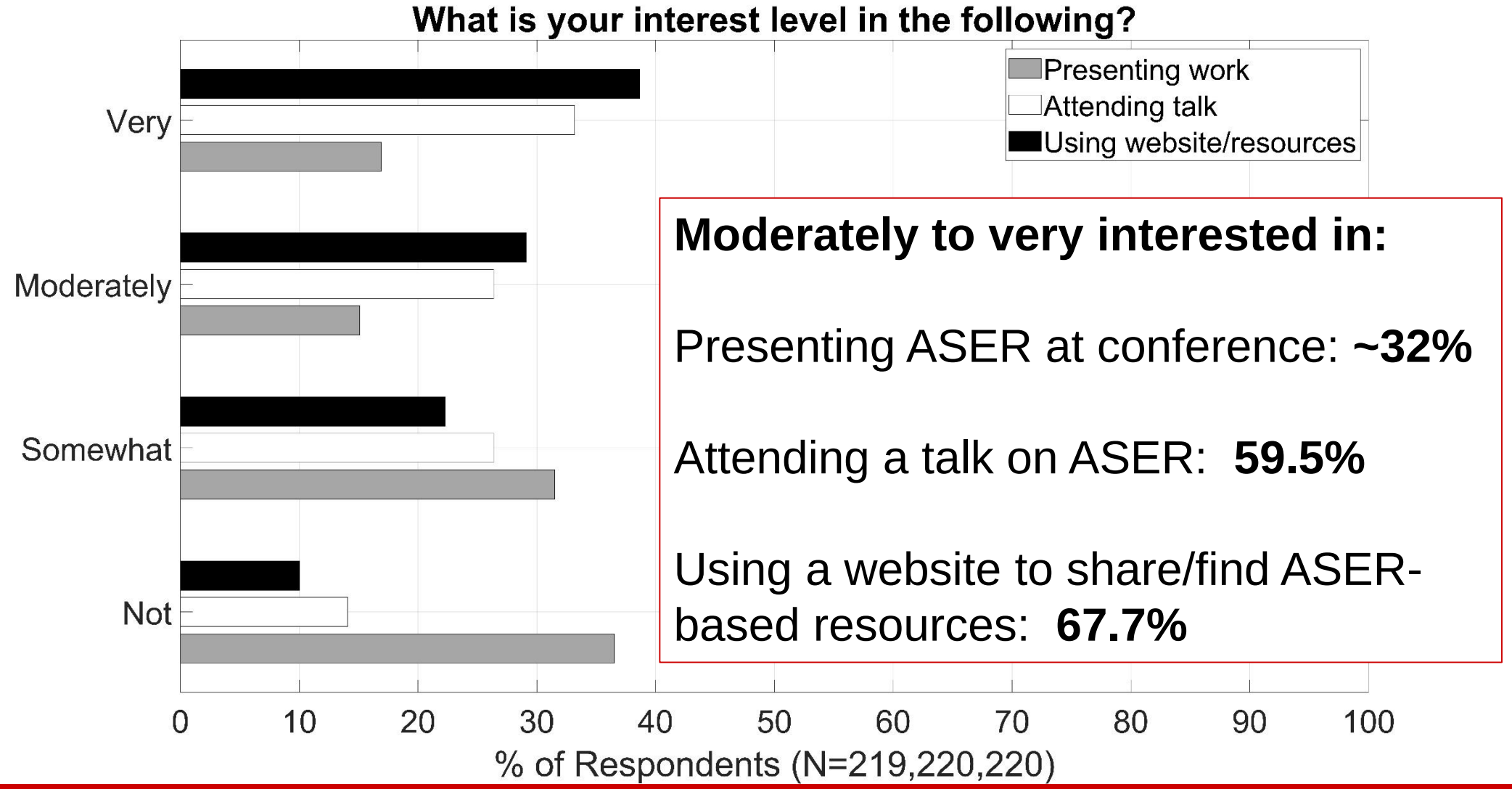

Moderately to very interested in:

Presenting ASER at conference: **~32%**

Attending a talk on ASER: **59.5%**

Using a website to share/find ASER-based resources: **67.7%**

Involvement in ASER

Approximately 20% of participants applied for or received funding for ASER project (N = 35)

Nearly 30% of respondents published an ASER paper (N = 45)

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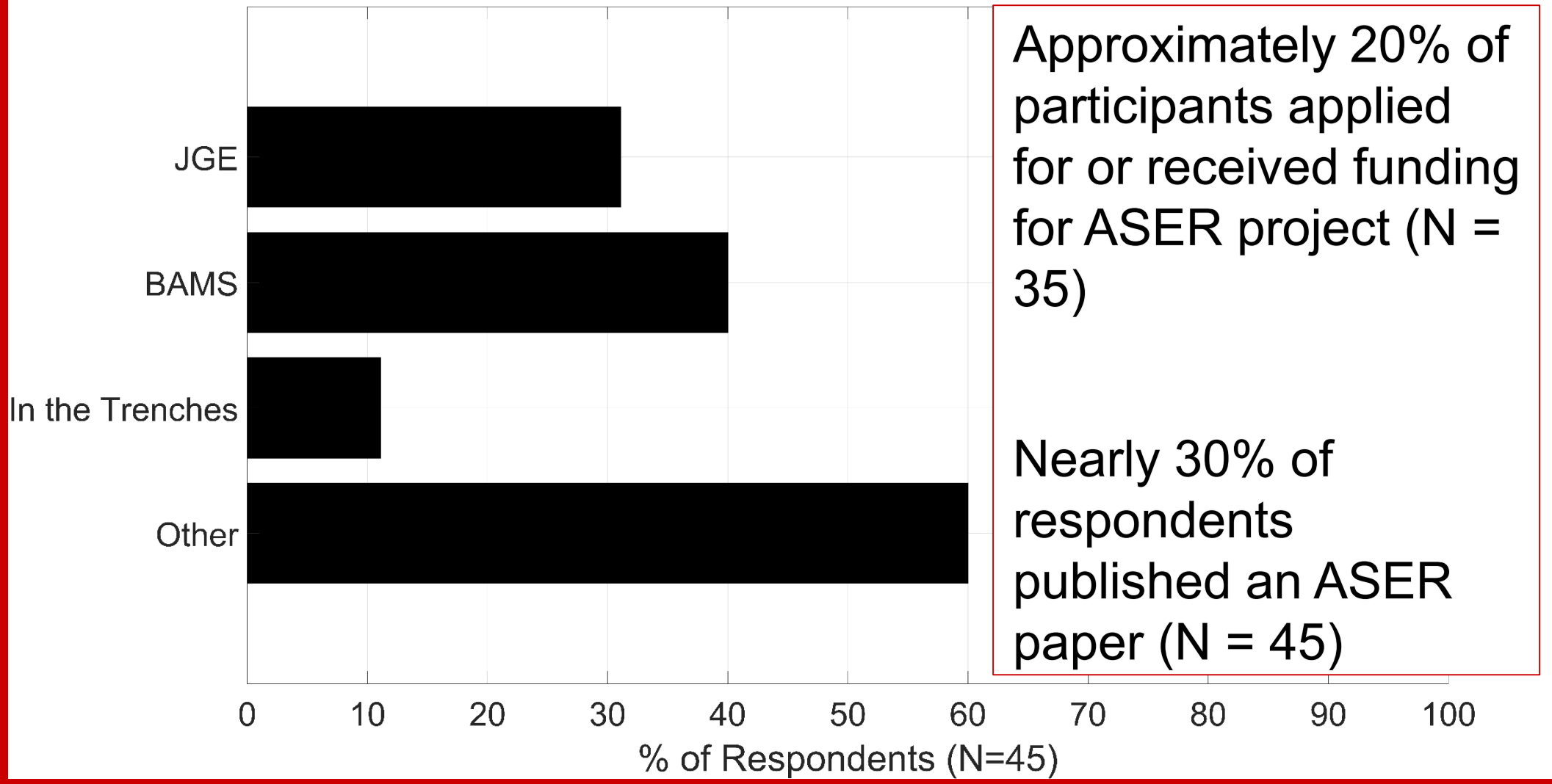

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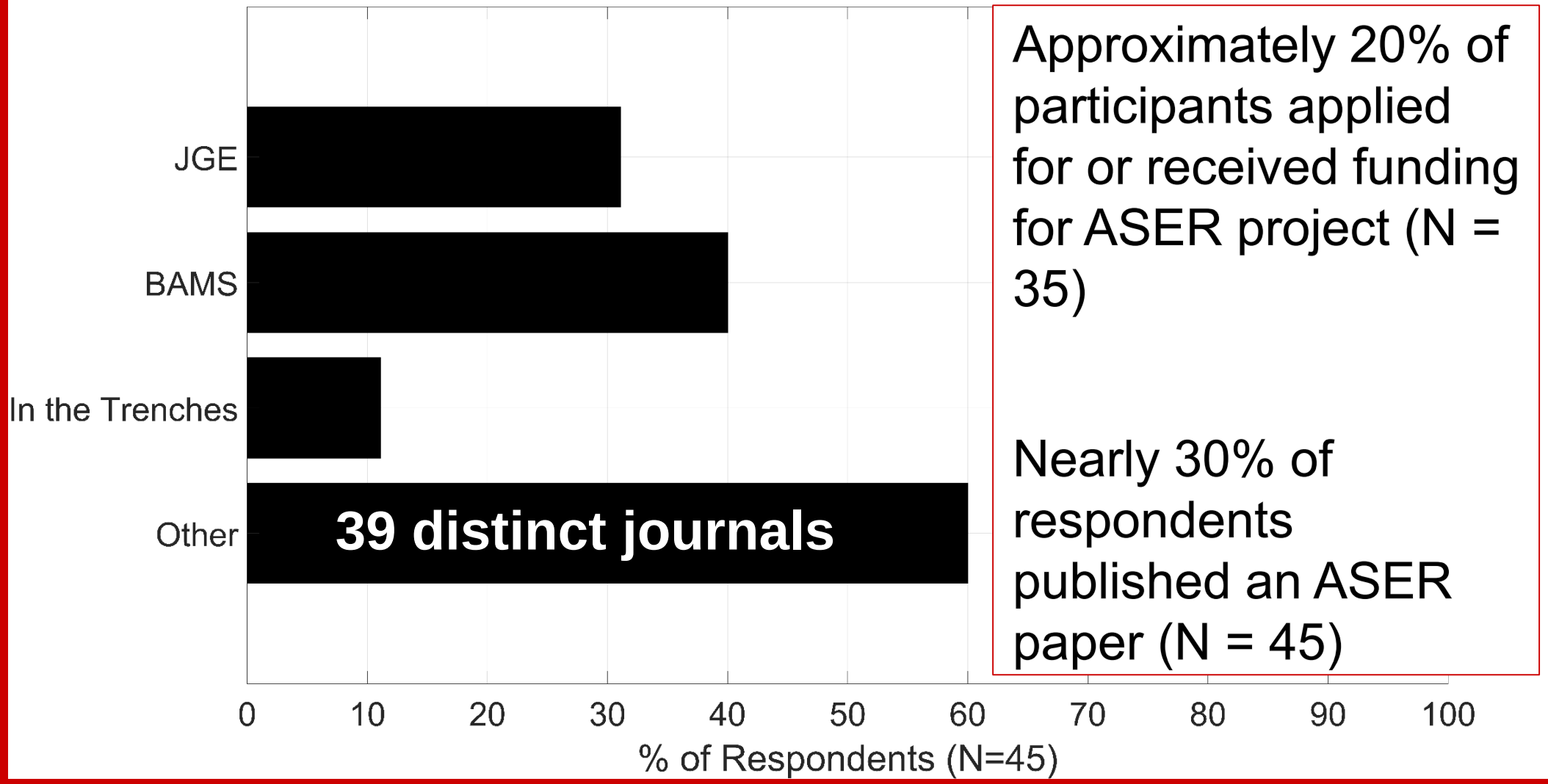

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Perceptions of existing merit structures

- How much weight should ASER carry toward tenure/promotion?
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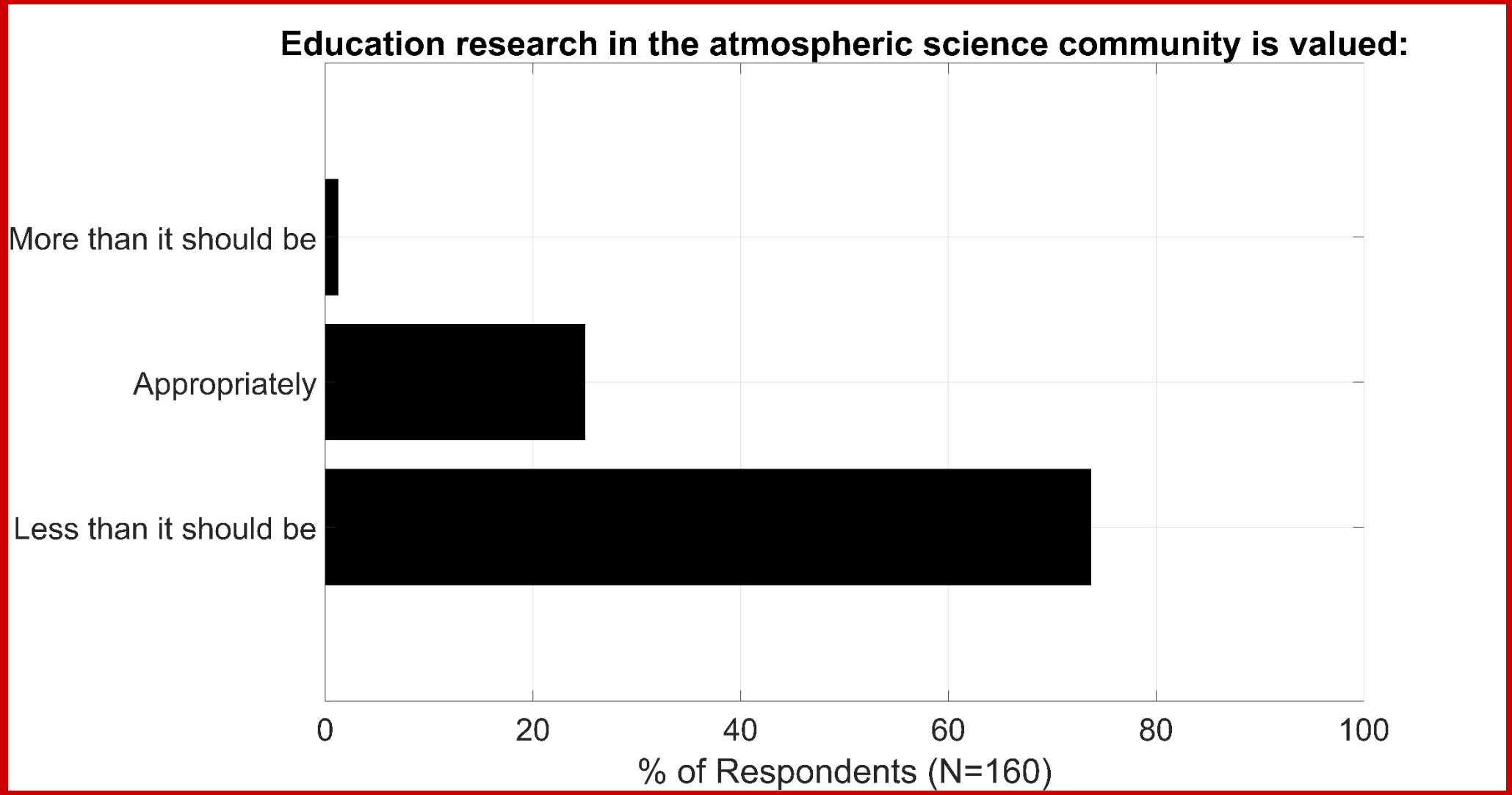
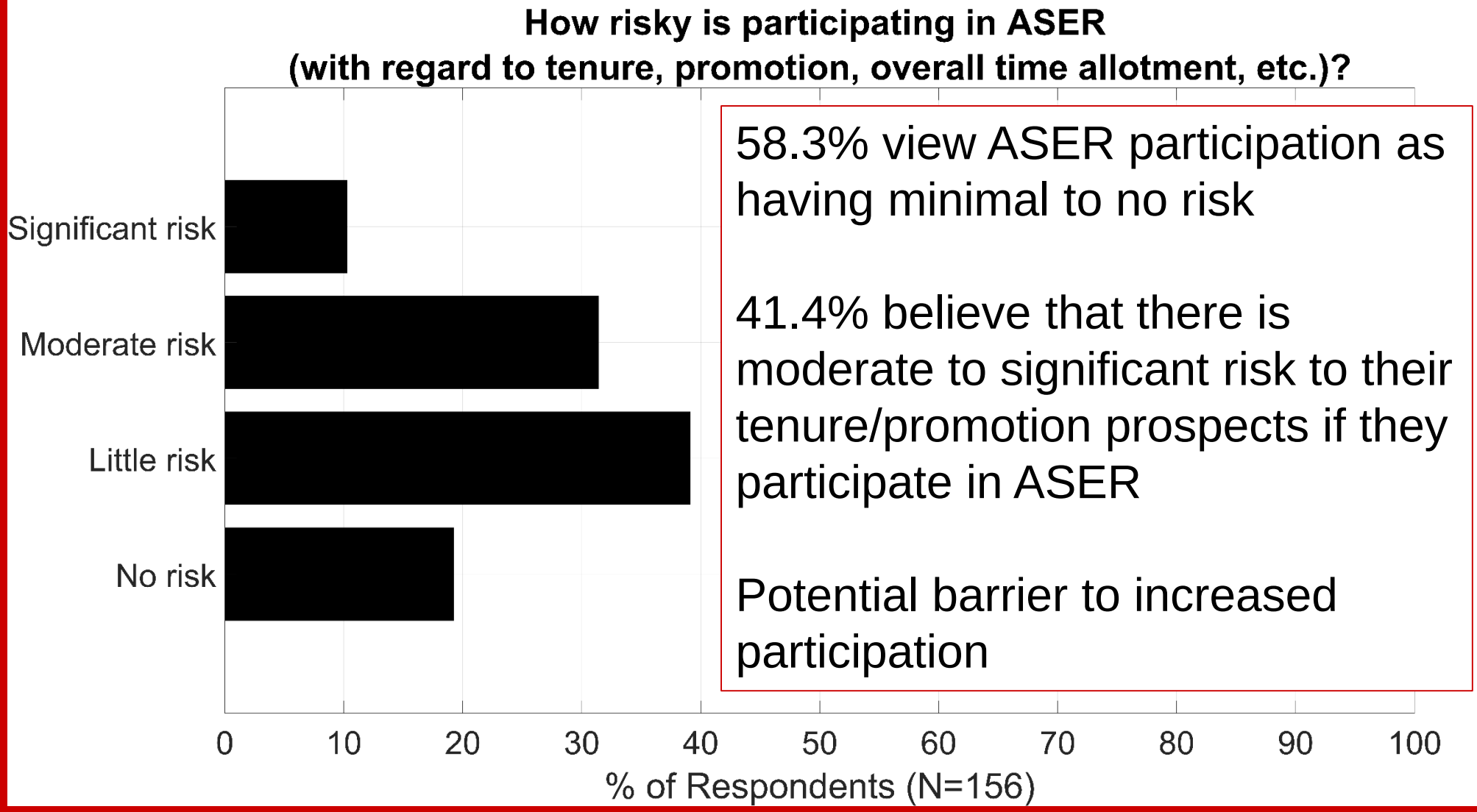
- How much weight should ASER carry toward tenure/promotion?
  - 80.5%, 81.7% choose moderate to significant weight
- How would conference presentation/peer reviewed publication on ASER be viewed as compared to other research project?
  - Equal weighting (42.5%, 48.4%)
  - **Less favorably (38.8%, 34%);** viewed as Teaching, Outreach, Service, Professional Development



Nearly 74% of respondents feel that education research is undervalued by the broader community

Potential Barriers



58.3% view ASER participation as having minimal to no risk

41.4% believe that there is moderate to significant risk to their tenure/promotion prospects if they participate in ASER

Potential barrier to increased participation

Resources

Most valuable experiences:

- Internal training
- Discipline-specific external workshops
- Longer-term

→High-impact training occurs in graduate school

Themes	Training (%)	Professional Development (%)
Internal	**49.5**	38.6
External	18.9	**28.1**
Longer-term	**75.8**	**62.7**
Graduate school	**29.8**	2.6
Informal	23.5	20.2

Surveyed community to determine…

1. The number of community members involved in ASER;

→20-30% of respondents (N = 35 – 45)

2. Whether ASER is valued within the community, and if so, to what extent;

→Yes! 85% of respondents view ASER as moderately to very important; uncertainty about value at institutional level or in broader community

Surveyed community to determine…

3. Potential barriers to involvement in ASER

→Lack of visibility of existing ASER work

→Lack of institutional support may be resulting in perceived risk

4. Resources necessary to encourage involvement in ASER?

Promoting effective change

- Feig 2013 conducted a small scale interview study of geoscience education practitioners; identified the perceived lack of recognition, lack of formal training, and a lack of access to education research publications as challenges
- Significant changes to teaching practices are more likely when support structures and feedback mechanisms are present (i.e., longer-term opportunities; Gormally 2017, McLaughlin et. al. 2010, Stains et. al. 2018)
- Results from this survey are in line with these findings

Recommendations

1. Improve access to ASER literature to increase the visibility and legitimacy of ASER;

2. Develop longer-term training and professional development opportunities for those interested in formally pursuing ASER, including at the graduate level;

3. Increase support for ASER projects, both internal and external;

4. Develop a web-based resource for sharing and finding research-based resources on teaching and learning in atmospheric science

Ongoing efforts

- AMS Ad-hoc Committee on ASER (convened Nov. 15th, 2018)
  - Provided written recommendations to the AMS Education and Human Resources (EHR) Commissioner on the role of AMS in supporting advancement of ASER (June 1st, 2019)
    - **Develop an ASER website with information and links to ASER-related resources**

→ Increase visibility and demonstrate that ASER is valued by the larger community

Ongoing efforts

Current website

unl.libguides.com/ASER

Ongoing efforts

Current website

unl.libguides.com/ASER

- ASER landing page on AMS Education & Careers website (in development)

Connect with the ASER Community!

Website

unl.libguides.com/ASER

Listserv

https://bit.ly/2FbDlx8

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Questions? Discussion?

1. Do we need an ASER journal or a special ASER issue?

2. What types of training/professional development would you like to see?

3. How can we advocate for increased support for ASER projects, both internal and external;

4. What kinds of web-based resources would be most valuable?