Navigating Climate Change in the Classroom: Teacher preparation, practices and perceptions

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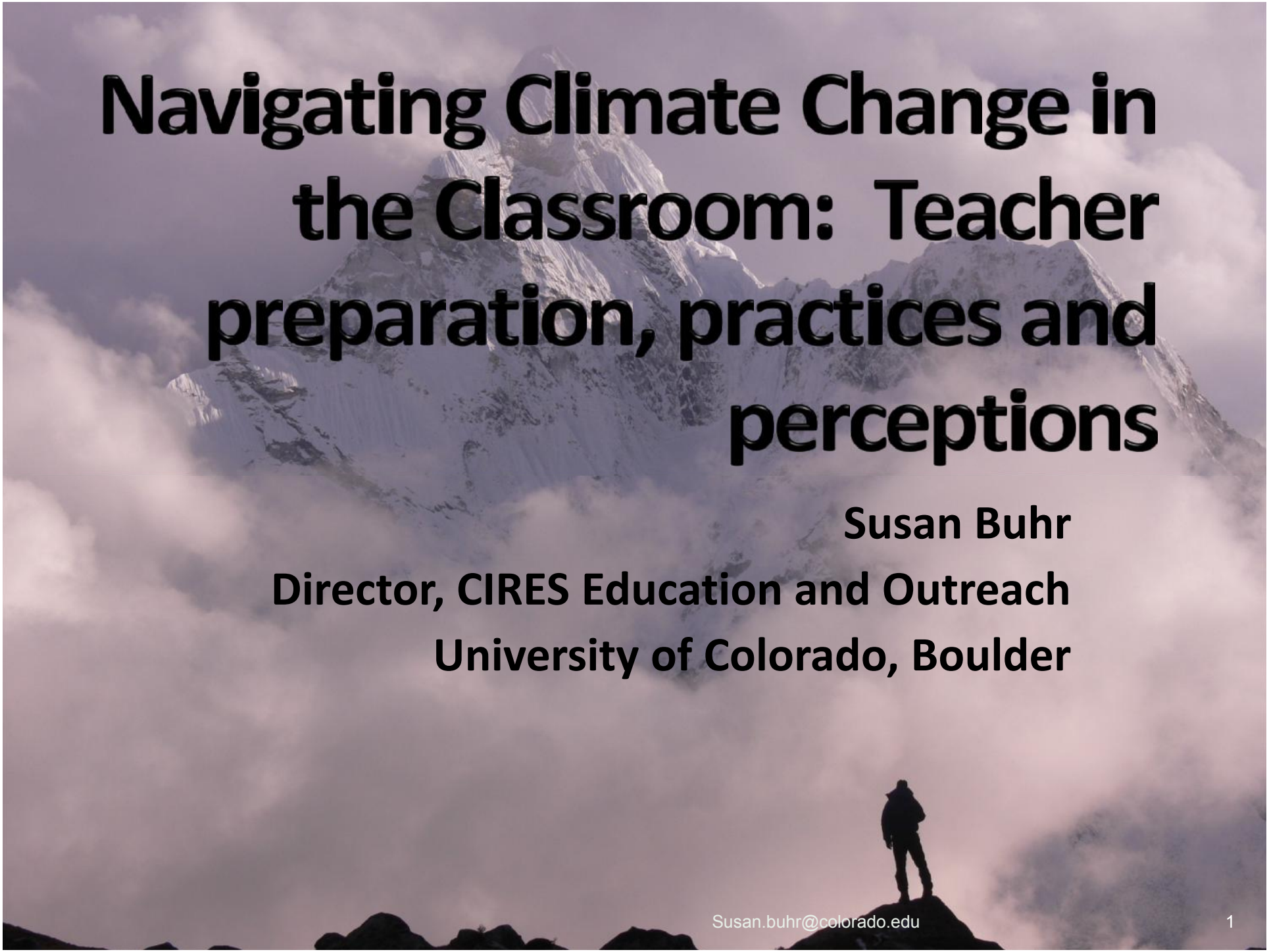
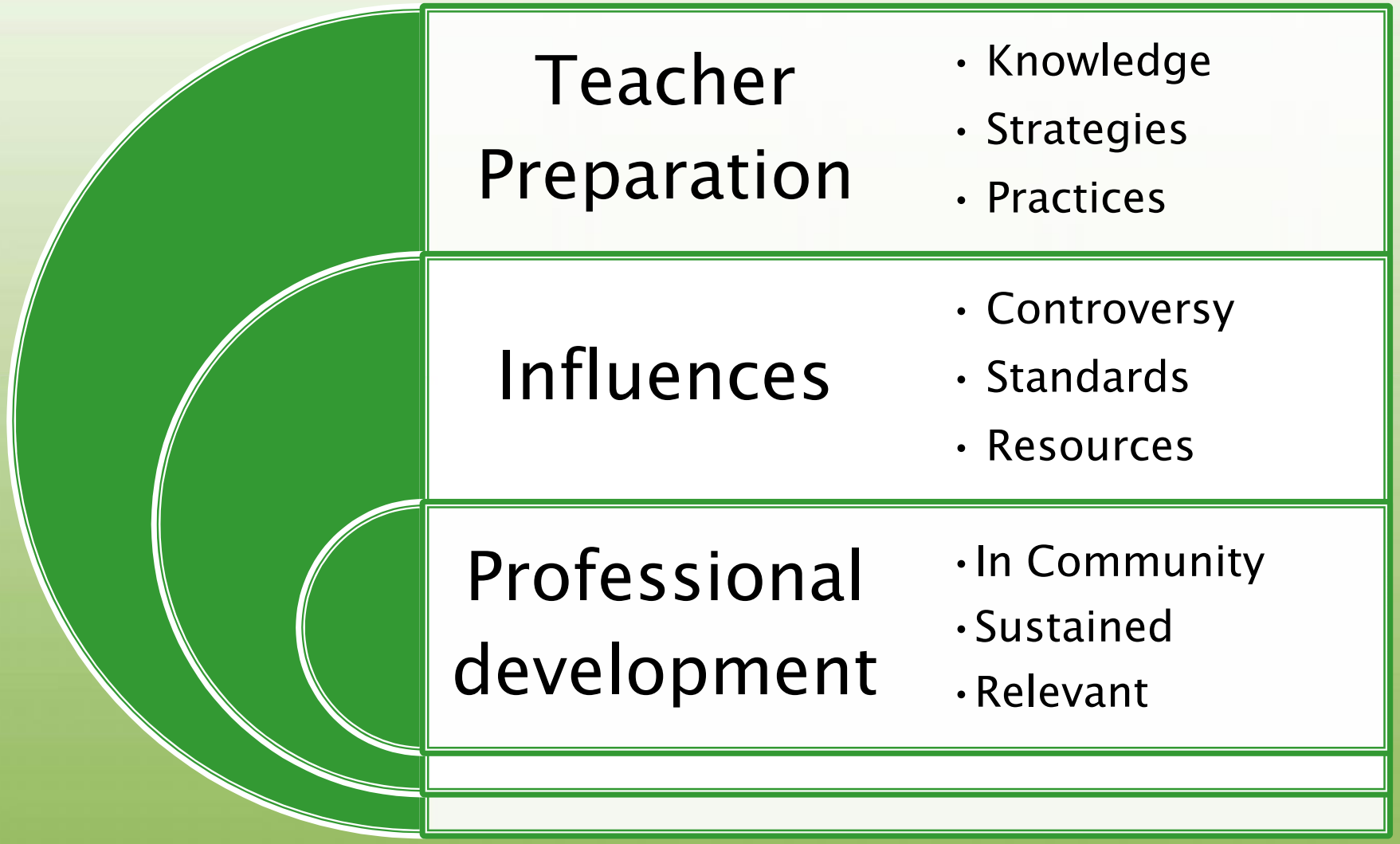


Introduction

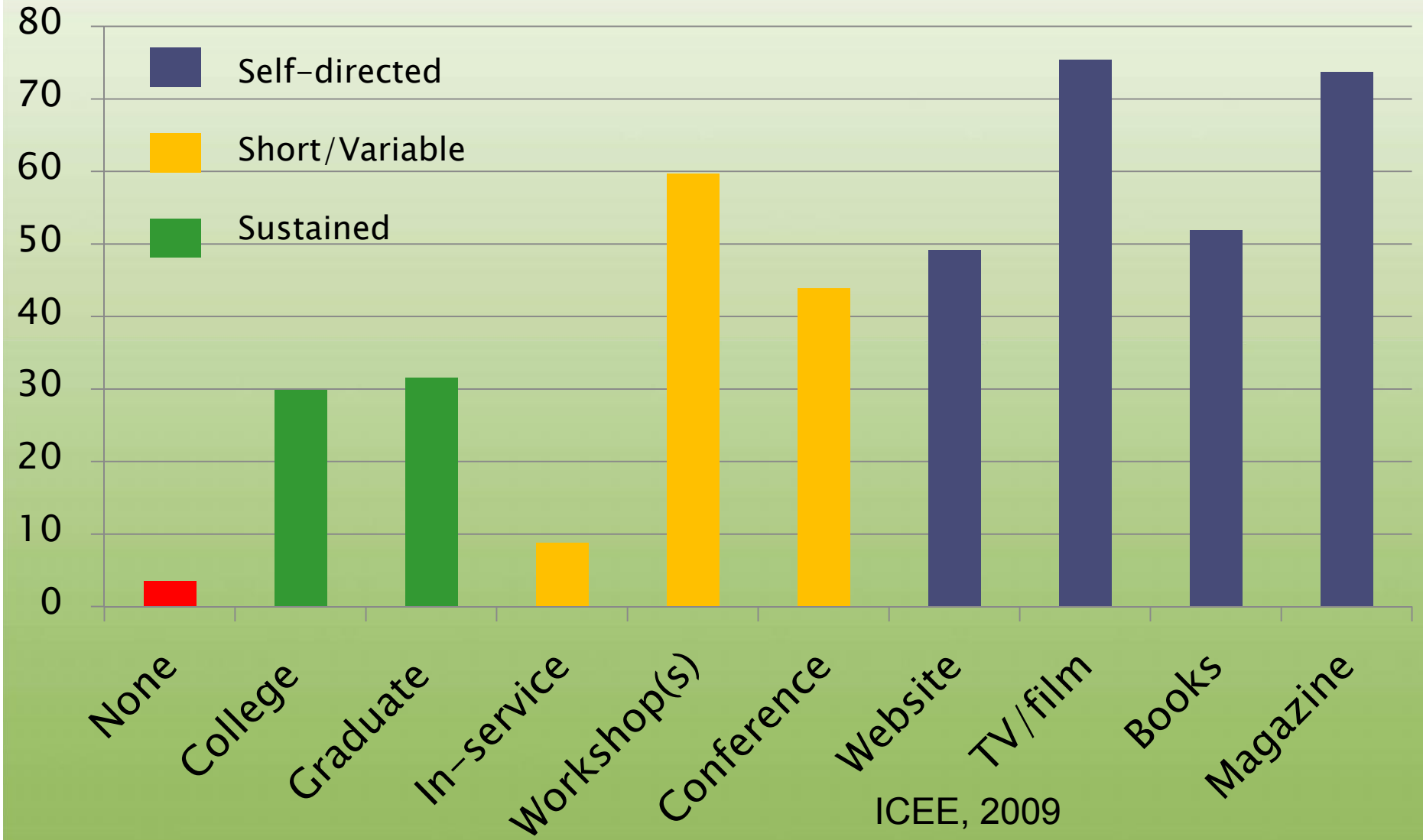


Context of this work

Year	Project	Secondary respondents (N)	Degree of engagement
2009	ICEE Needs Assessment	284	61%
2010	CLEAN Invitational Survey	300	56-93%
2011	CLEAN Informant Network	145 (97% response rate)	80% middle school 88% high school

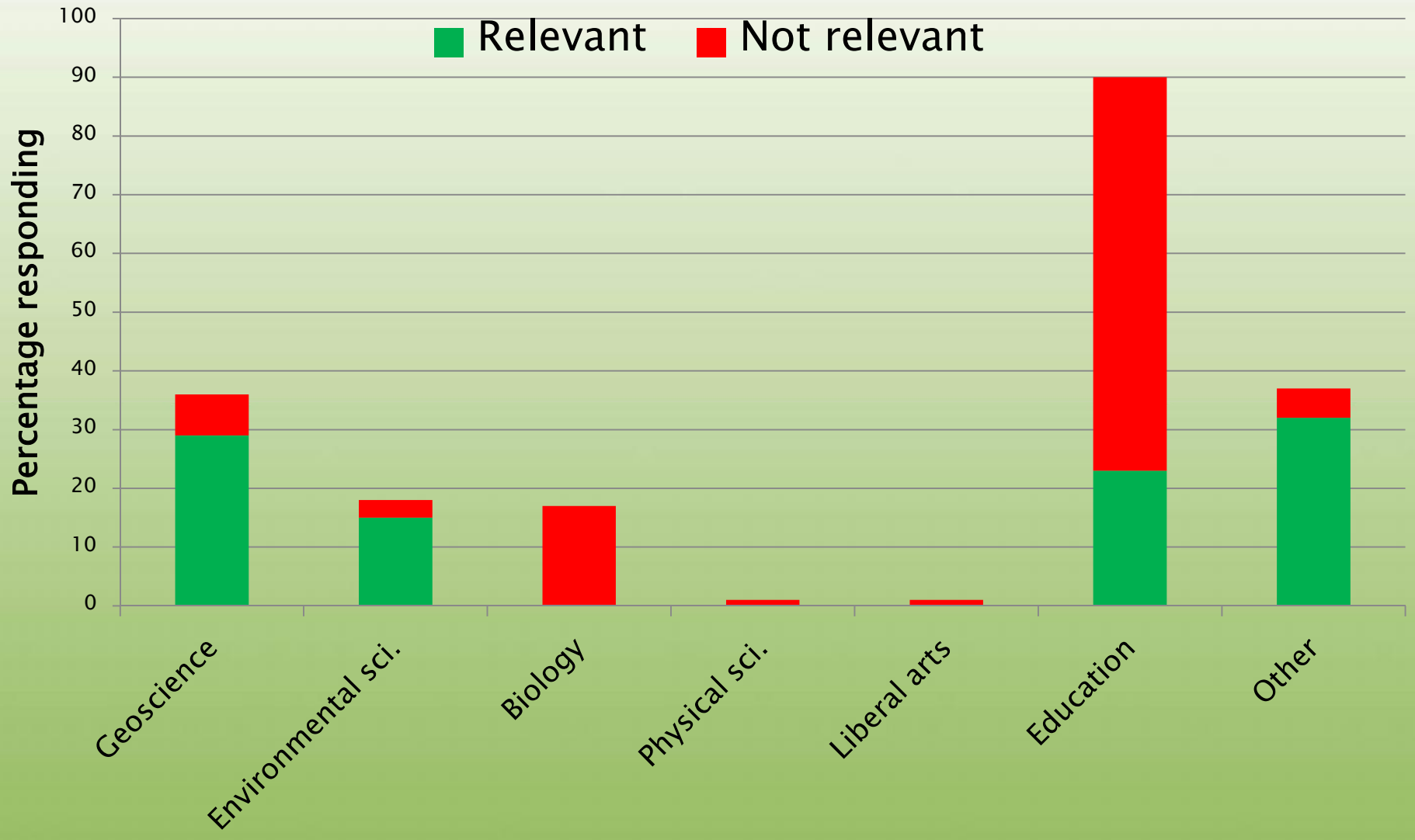
What do you hear from teachers about their preparation?
Their perceptions about climate science?

Preparation: learning experiences (%)



ICEE, 2009

Perceived relevance of degree



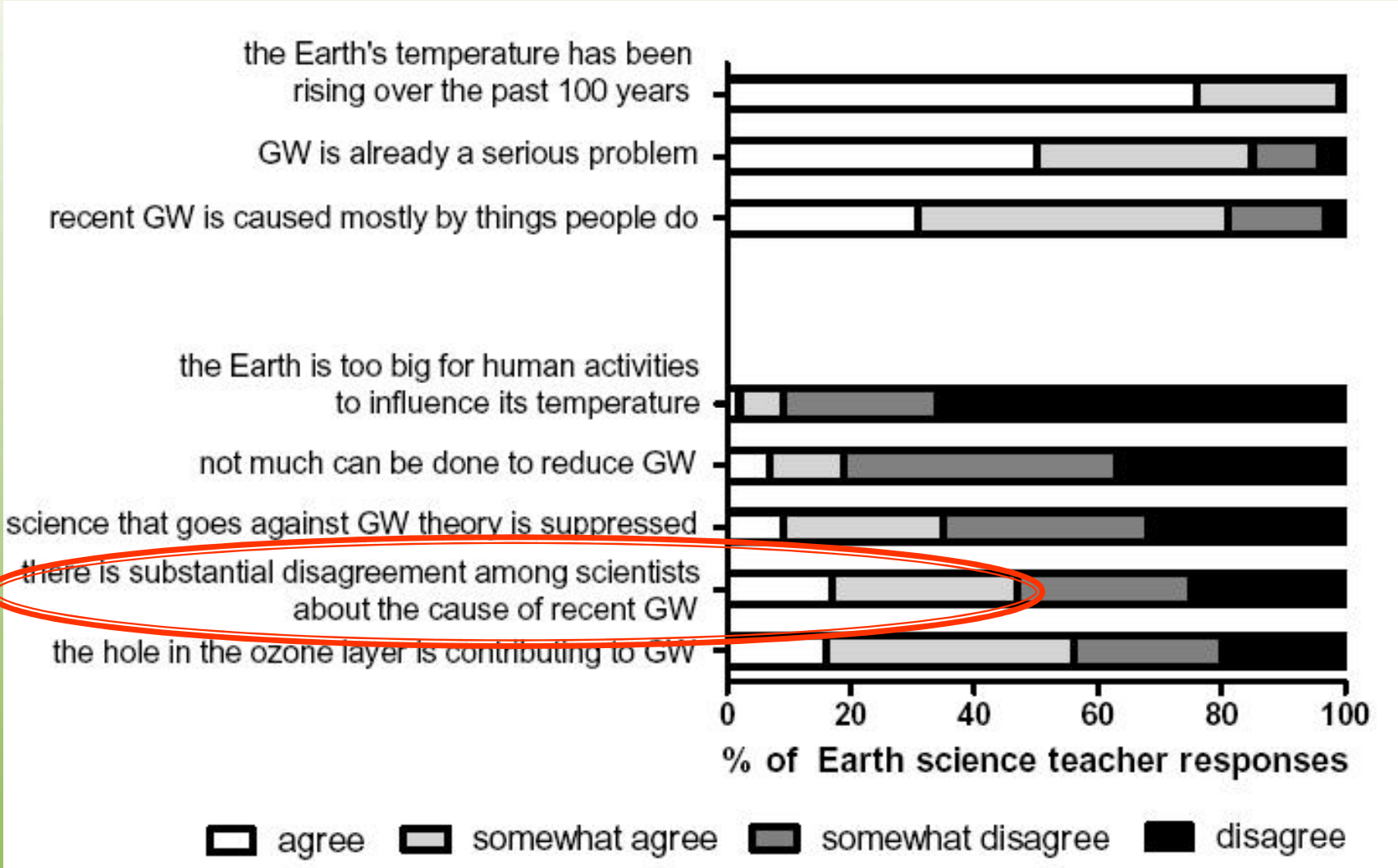
Field of highest degree and perceived relevance

Preparation: Coherent knowledge

- More comfort with Earth Systems
- Less comfort
  - Climate concepts (greenhouse effect)
  - Emerging topics (what will happen here?)
  - Evidence–how scientists know

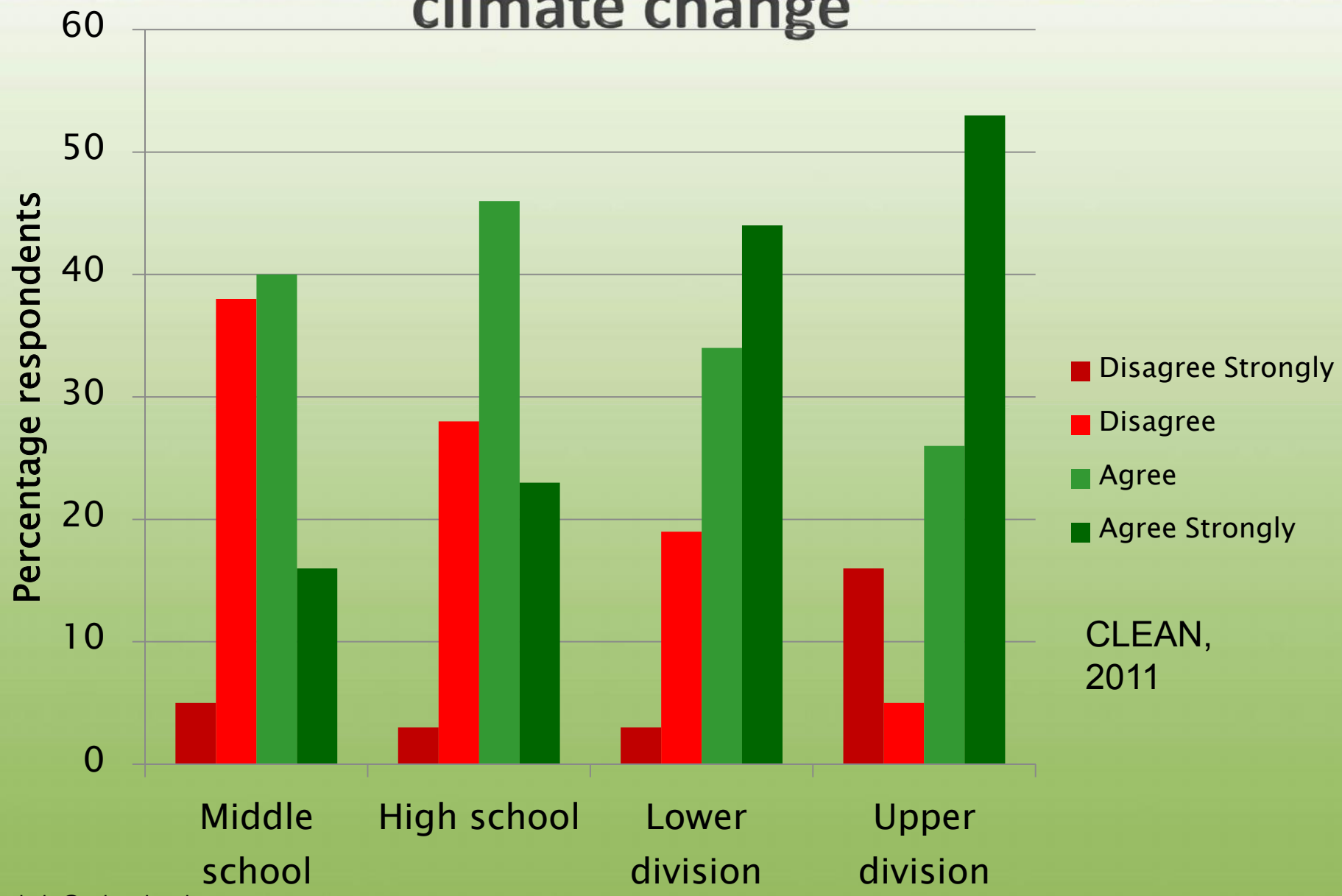
"I was confused by the Izzit '*Unstoppable Solar Cycles*'" ICEE 2010, CLEAN 2011

Preparation: Alignment with science

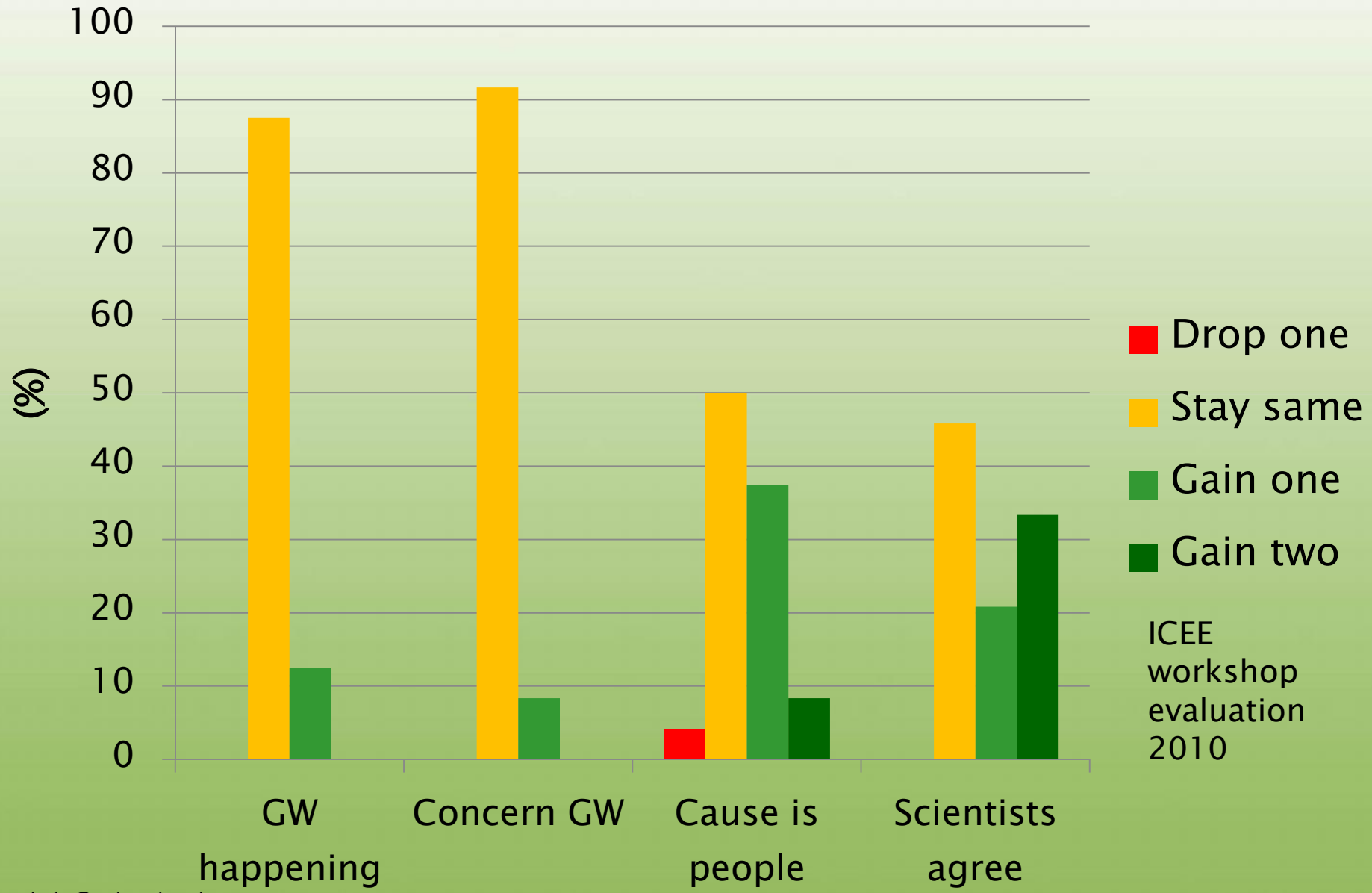


Wise, 2010

"Scientists agree about the causes of recent climate change"



PD shifts knowledge



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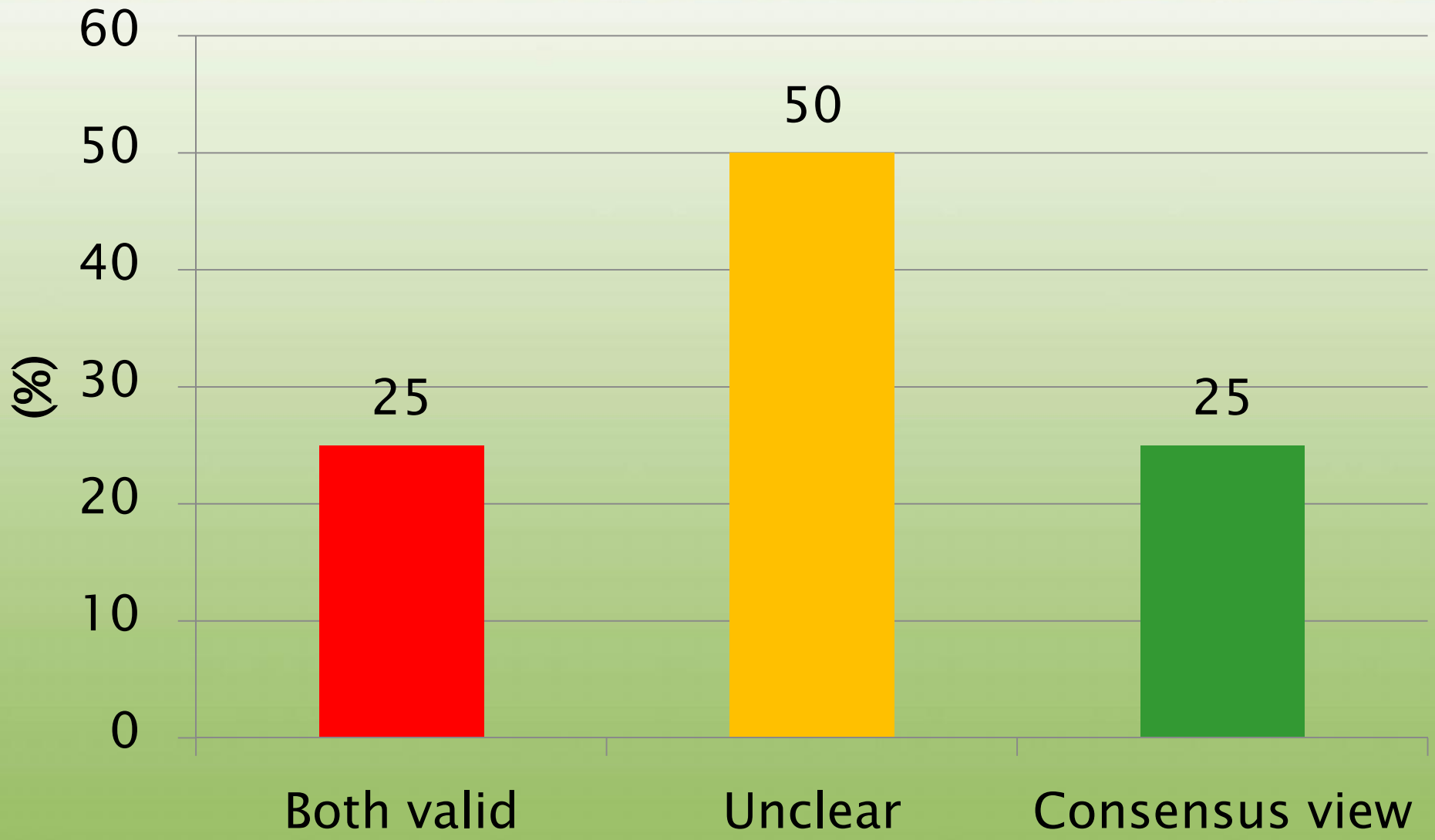
"Both sides" Reasoning 2007



Wise, 2010

Climate science not accepted

2009-2011

- "…global climate change is both premature and over-hyped, too much media, too little long term science investigation other than recent trends…"
- "I was taught…in late 1960 that we were in fact entering into another "ice age" and today… I am to teach the other end of that continuum?"
- "Right now I am very concerned over the global warming emails and the implication that data has been changed…How can I teach about global change if scientists are not being honest about their results?"

Reasoning unclear

2009-2011

- "**Teaching both perspectives** of the issue within time constraints."
- "More support materials-**from both sides of the argument are needed-in** order to give this topic the time and depth needed to really inform and educate students."

- Denialist? Needs PD? Unclear…..

Climate science accepted

2009-2011

- "I am much more confident in my knowledge and the ability to answer student questions, as well as be able to **direct students to valid data sites for them to learn to read and interpret the scientific data for their own evidence.**"
- "I am learning to rely on the science (evidence) and **let the facts speak for themselves.**" This makes it easier to present to students…and to other teachers."
- "I want to objectively present the scientific data that presents climate change is real and an issue of immediate concern."

What do you hear from teachers about their barriers and concerns?

Top Instructional Barriers

- Lack of alignment with standards
- Lack of content knowledge
- Parent, student beliefs

Wise, 2010
ICEE, 2009
CLEAN, 2011

- *Vocal **school board members** have approached administration, claiming that it is not occurring*

- ***Students** have been told that "global warming" is not real and that hurdle is hard to cross sometimes.*

- *It conflicts with my students' **religion/faith**.*

- *We have some **parents** that do not believe in climate change/warming*

ICEE, 2009

Strategies to forestall controversy

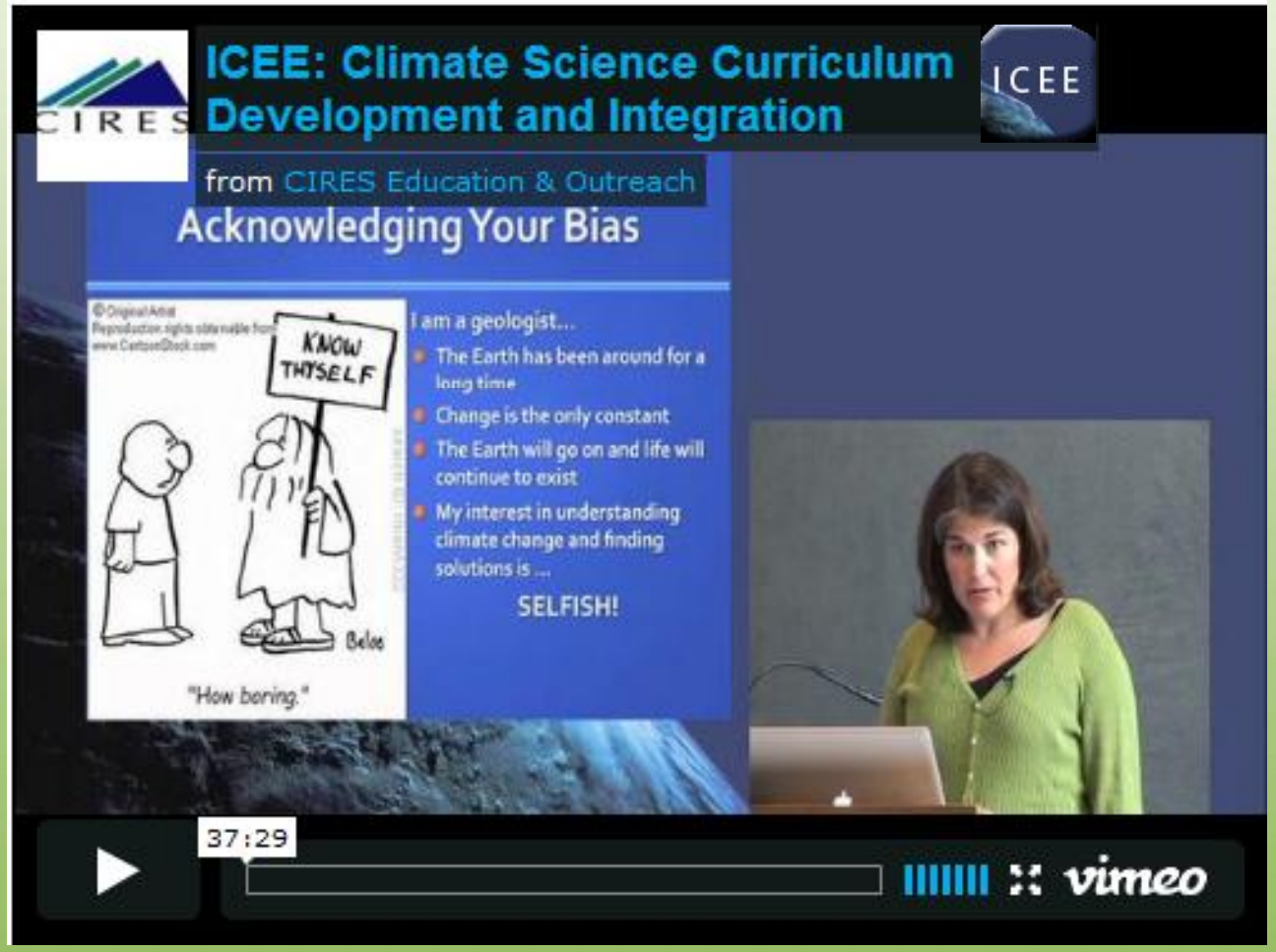
Before instruction:

- Align with standards and curriculum
- Frame for learners' perspective
- Find high quality resources- evidence/inquiry
- (Maybe) talk with administrators

Strategies to forestall controversy

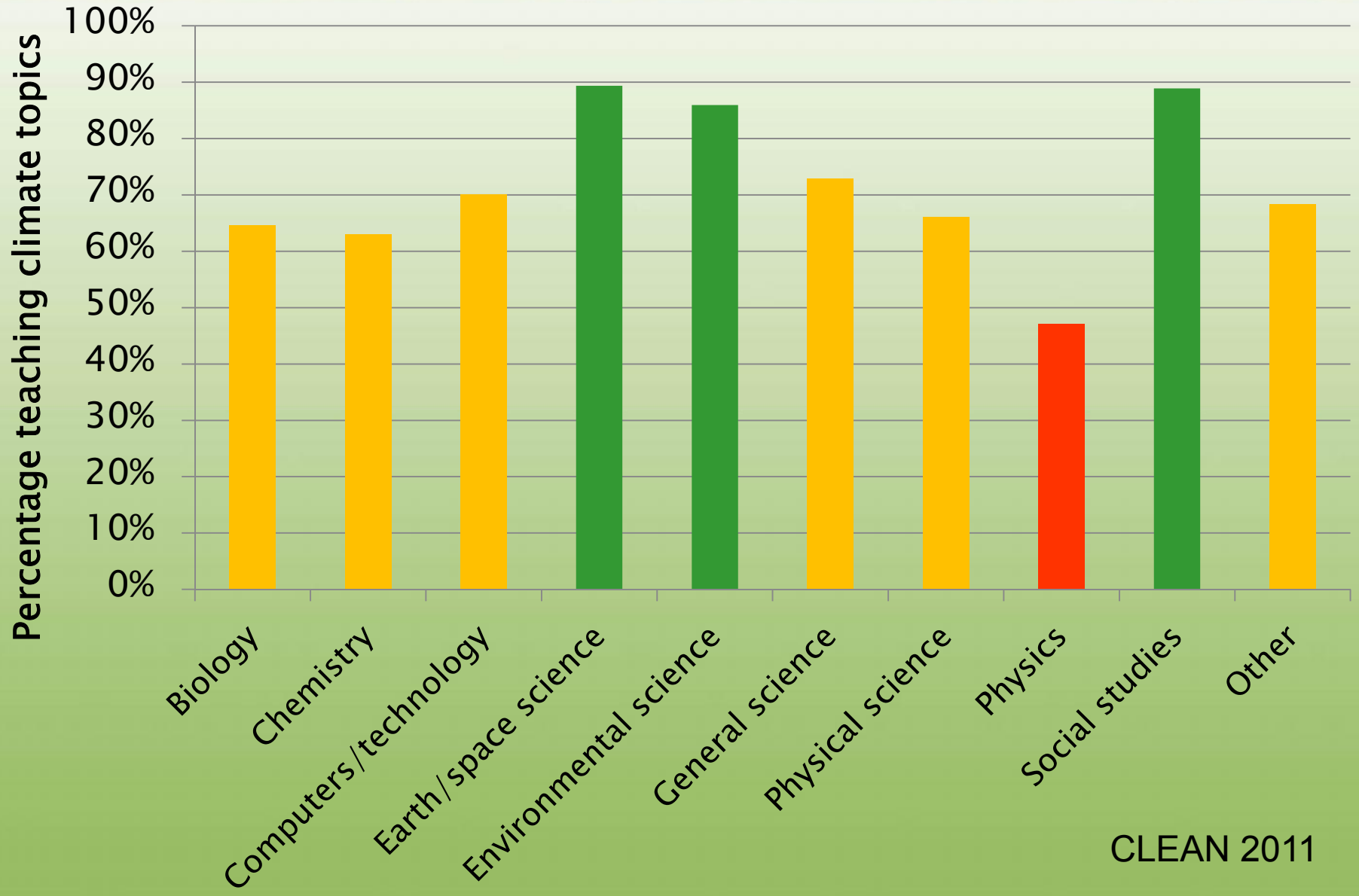
- **During** instruction:
  - Employ inquiry, evidence-based pedagogy
  - Controversy as a teachable moment
  - Integrate climate throughout
  - Outside speakers
  - Integrate solutions

ICEE Teaching Videos



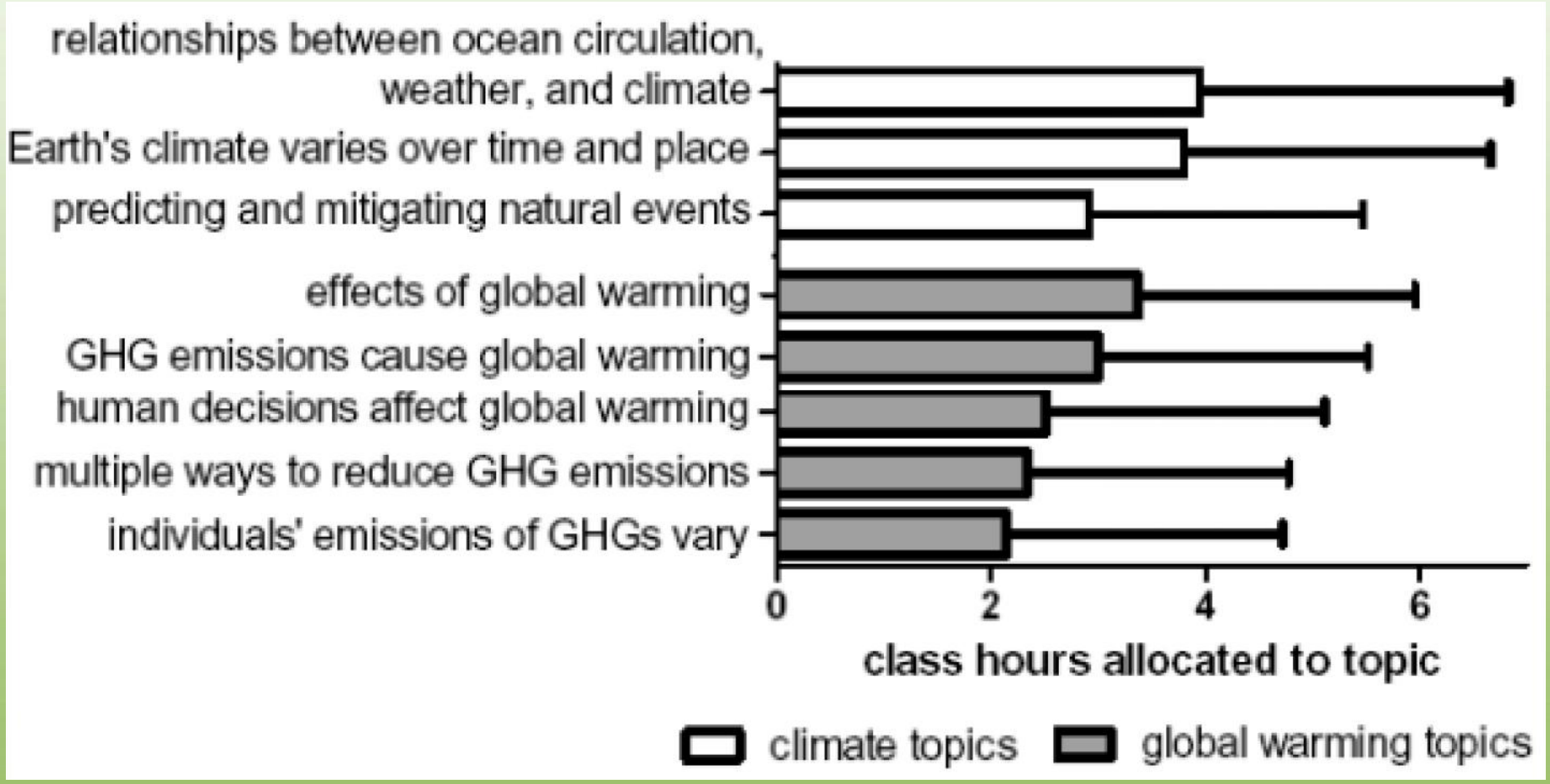
Cheryl Manning, Colorado High School Teacher

Practice: where climate topics are taught



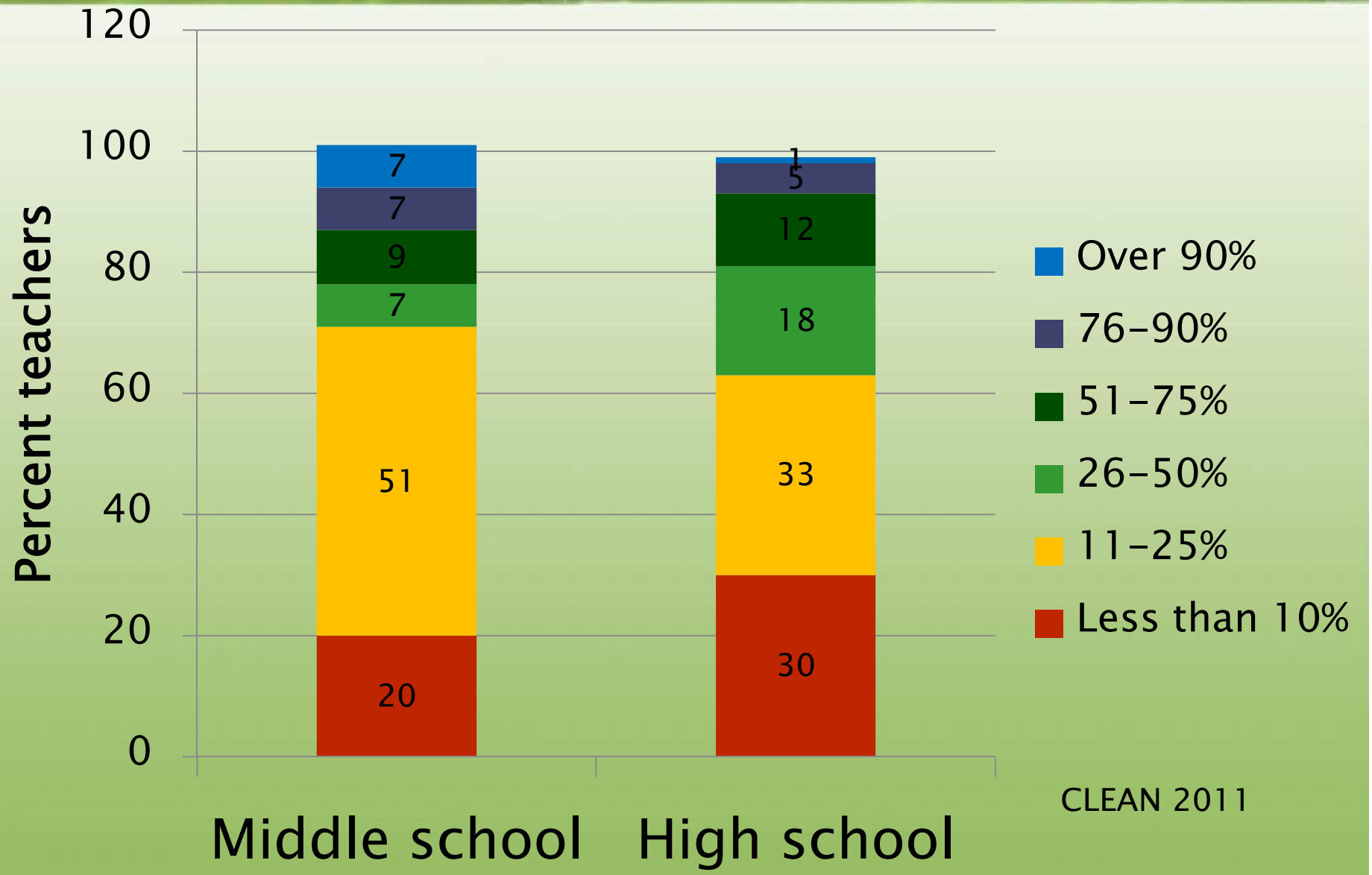
CLEAN 2011

Practice: Time by topic

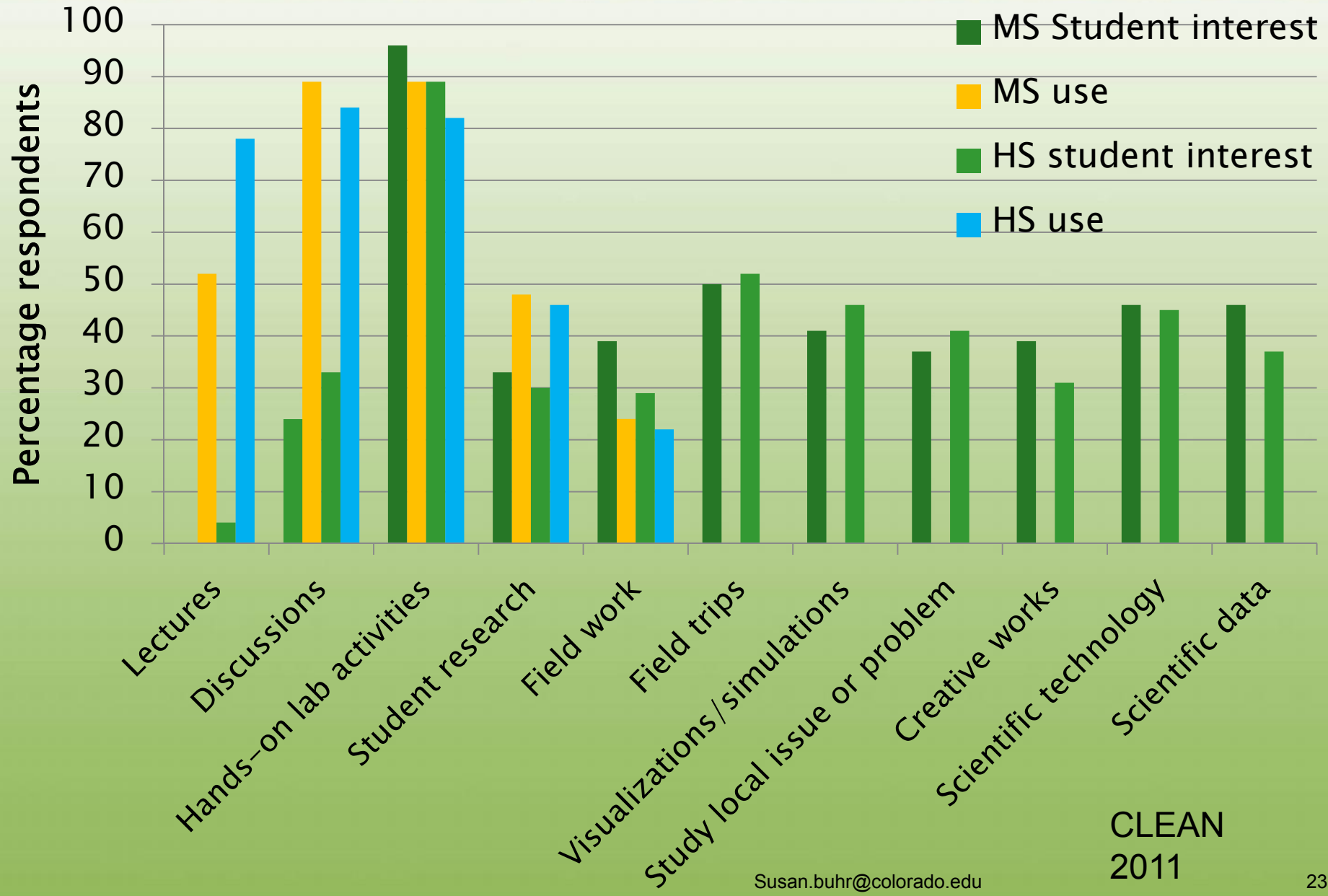


Wise, 2010

Practice: Instructional time for climate

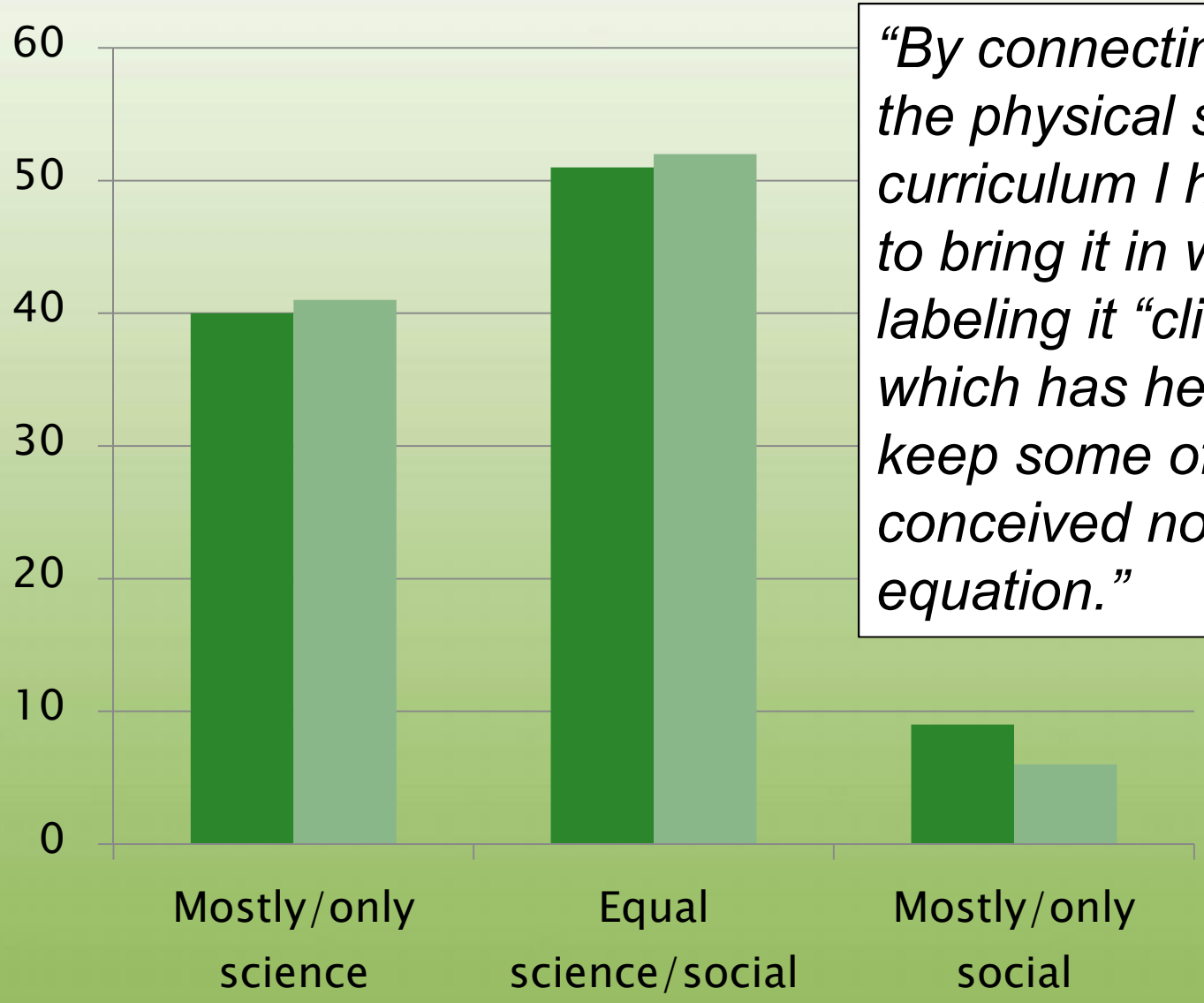


Teaching practice vs. student interest



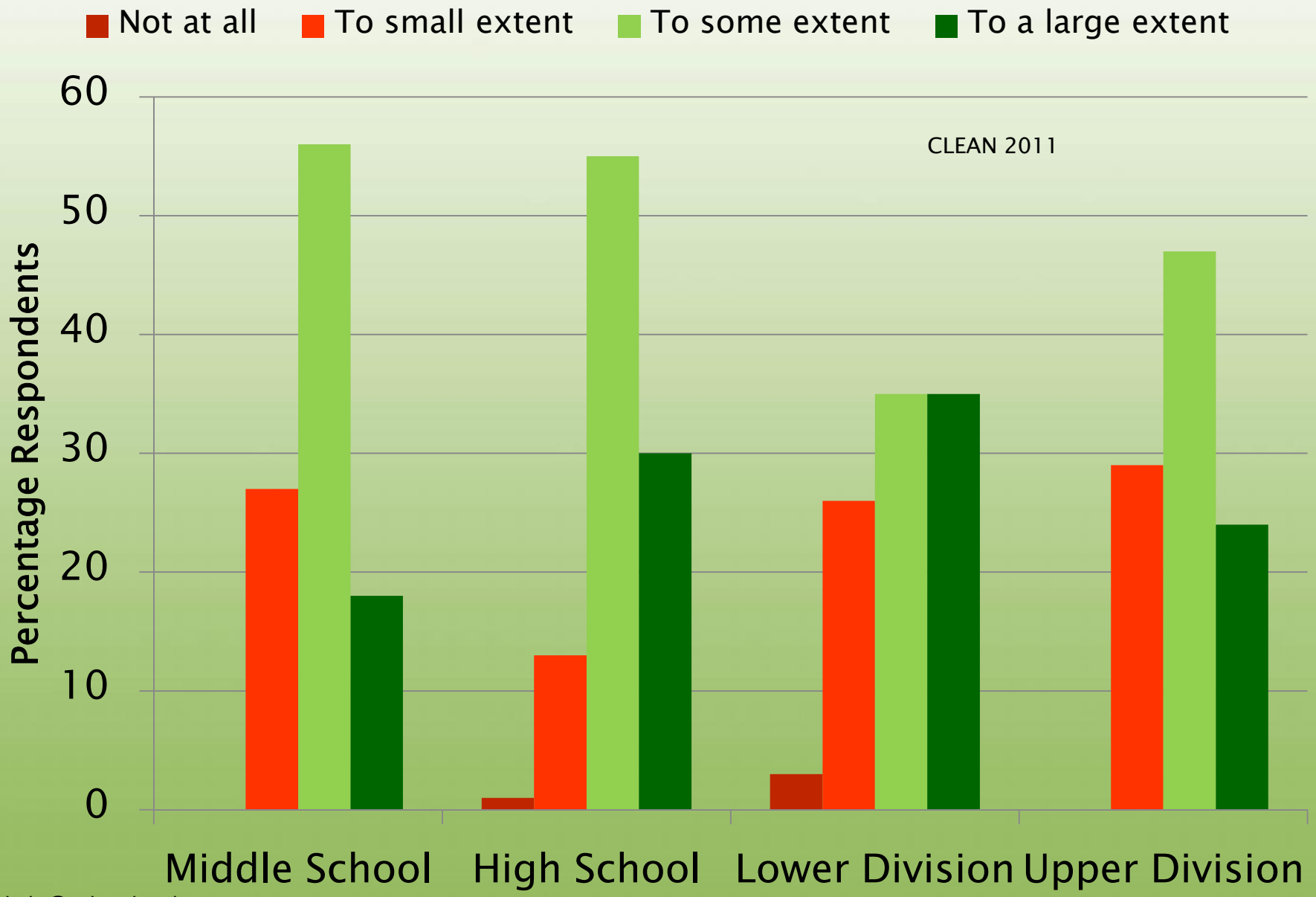
CLEAN 2011

Practices: Integration cross-topic



"By connecting this within the physical science curriculum I have been able to bring it in without really labeling it "climate science" which has helped me to keep some of the pre-conceived notions out of the equation."

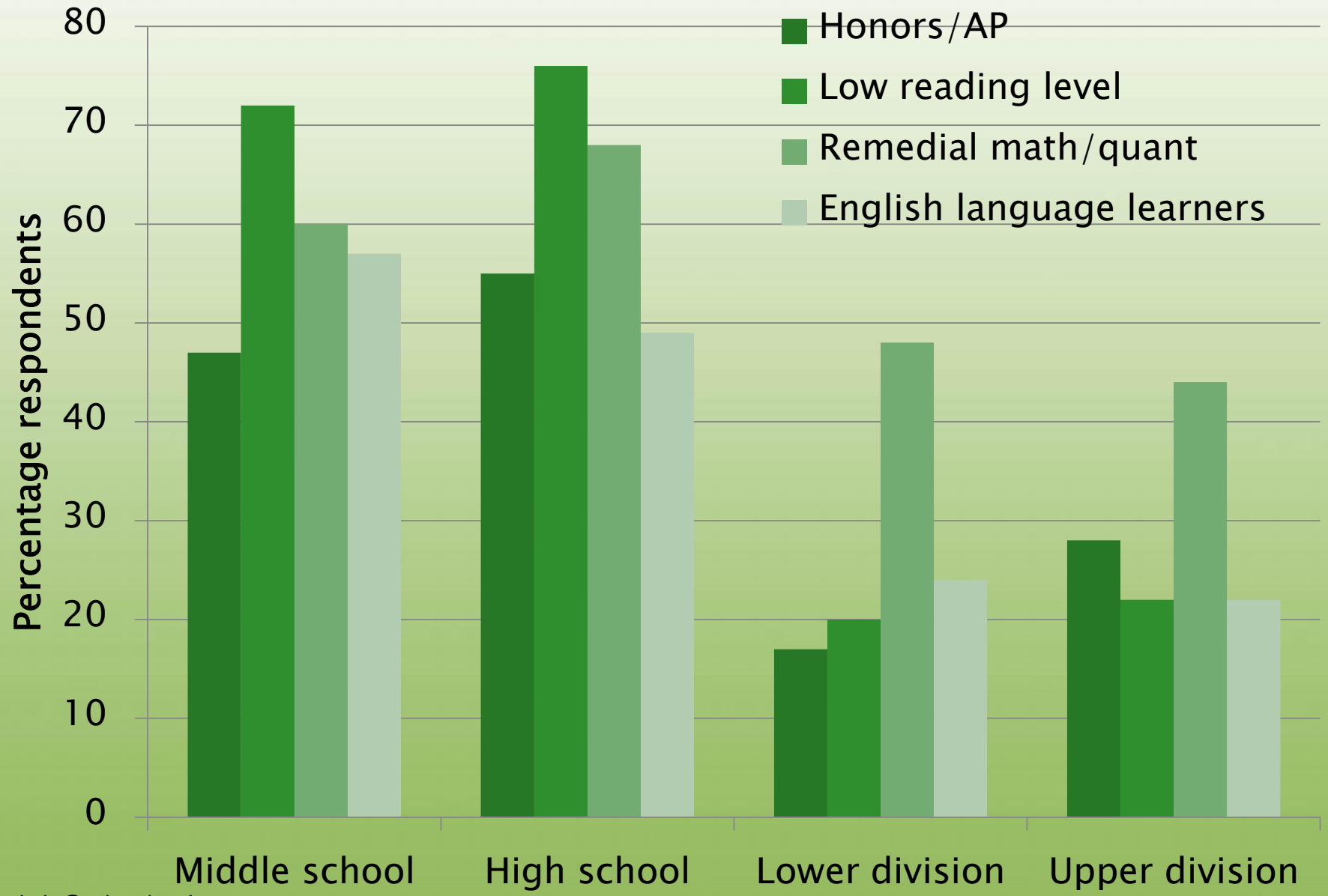
Extent to which solutions are considered



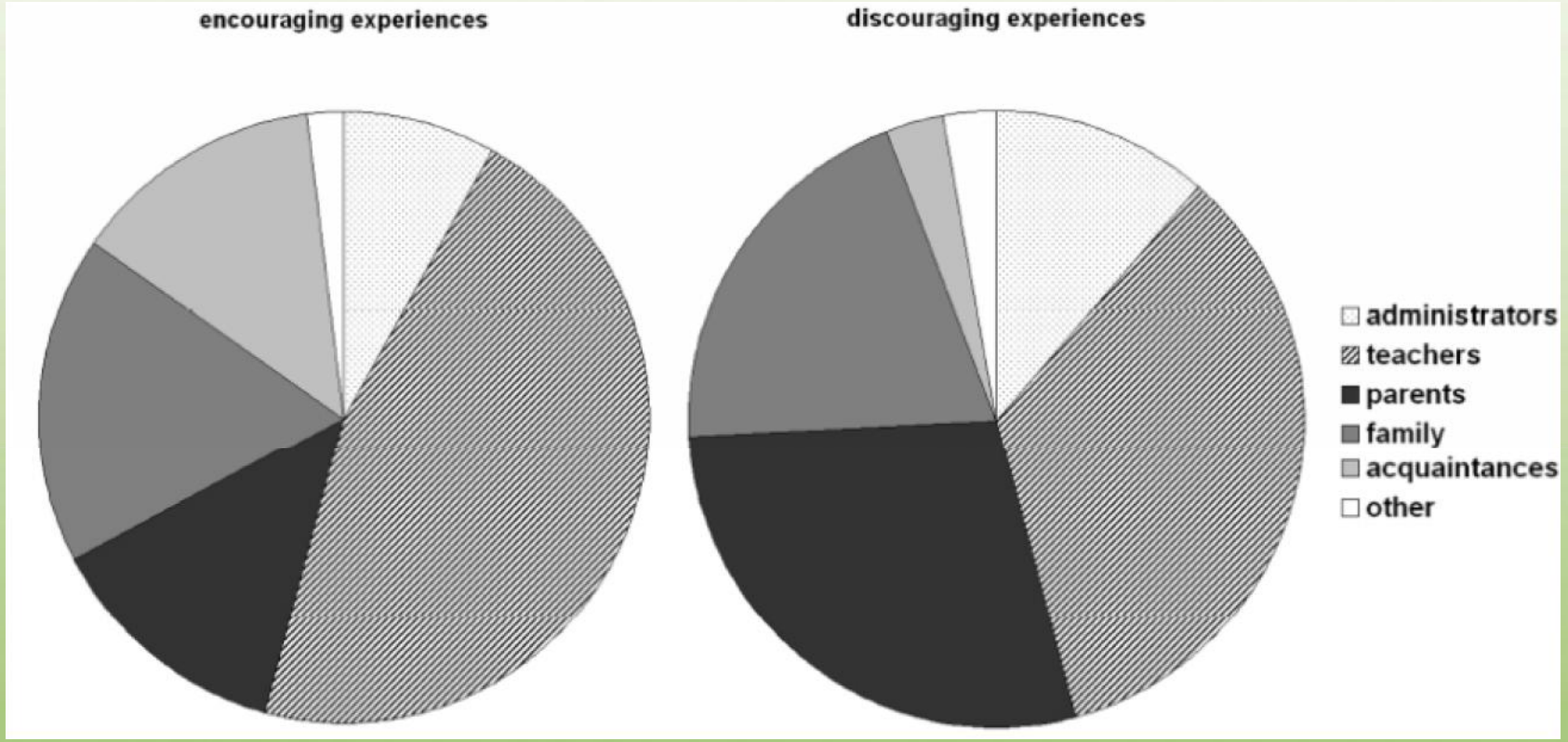
Reviewed climate and energy resources

http://cleanet.org/

Need better materials

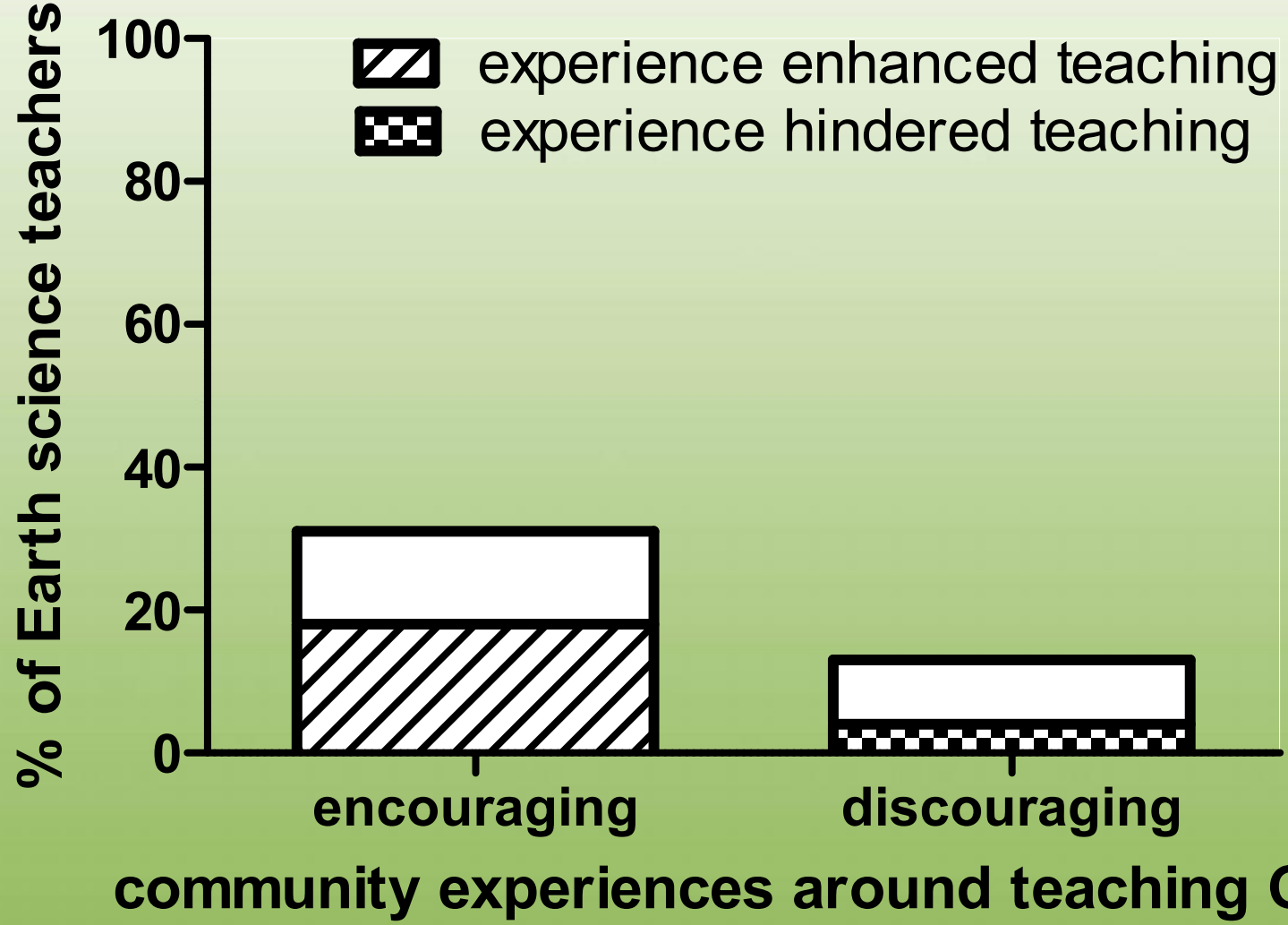


Sources of encouragement



Wise, 2010 JGE

Importance of community



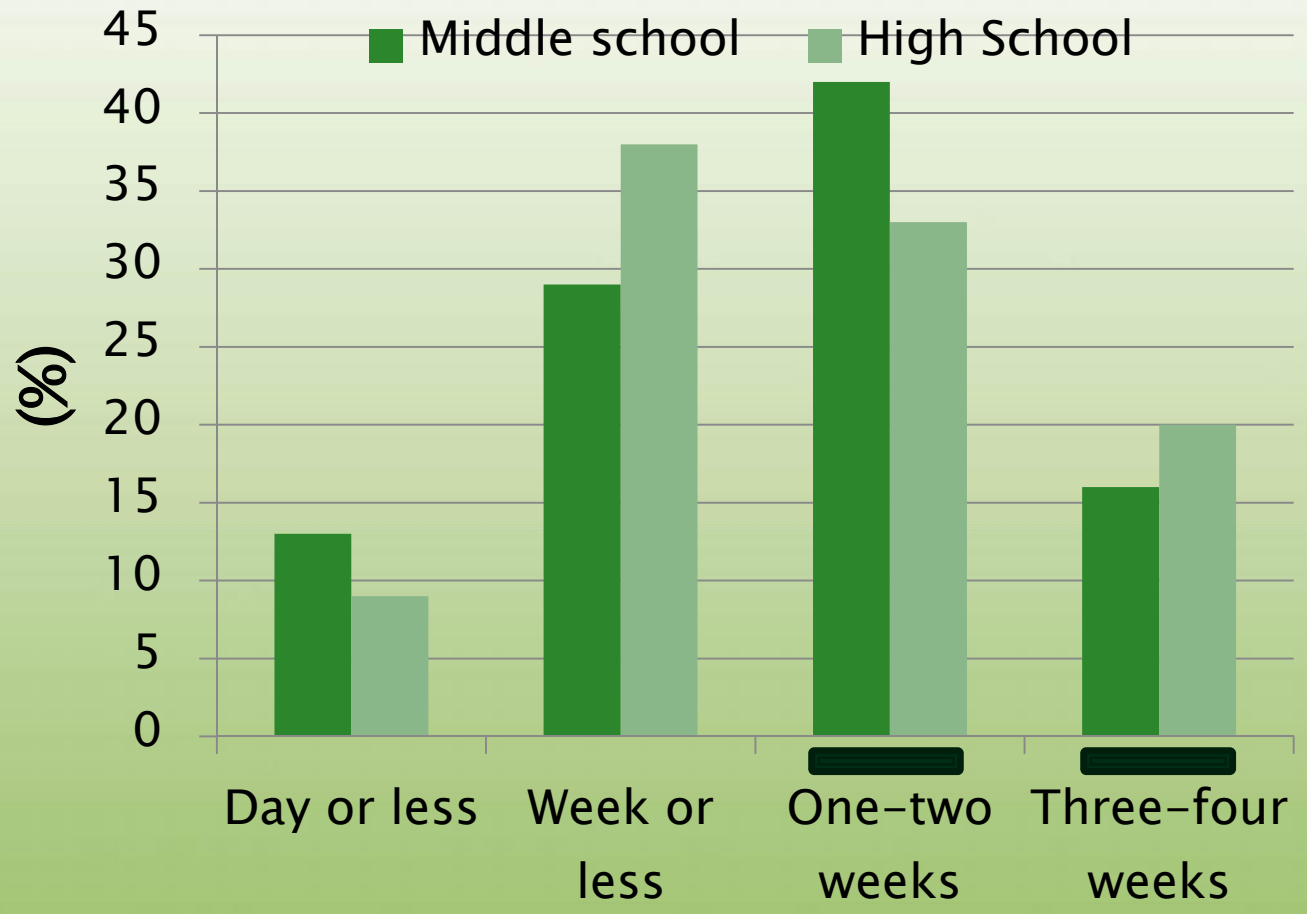
Wise, 2010

Participation in PD/community

- Most perceive institutional support
- Most perceived as resource by colleagues
- Climate scientist connections
- National science/ education communities
- Local/regional communities

Iceeonline.org/forum and listserve

Valuable PD: Sustained



Amount PD taken

CLEAN 2011

Professional development opportunities

- Online course ICEE Spring 2012
  - 3 credit grad ENVS or Continuing Ed or nominal admin fee
  - Teaching strategies, Essential Principles Climate Lit, capstone local teaching activity
  - Email susan.buhr@colorado.edu
- CLEAN webinars

  http://www.cleanet.org/clean/community/webinars/index.html
- CLEAN online faculty workshops
  - April 2-14, 2012 – Communicating Climate Science in the Classroom
  - May 7-16, 2012 – Teaching Climate Complexity

Conclusion

Opportunities:

- Reach to all society
- High interest
- Encouragement is effective
- Potential standards alignment

Challenges:

- Persistent controversy
- Lack of alignmnent with standards
- New topic for most

Spacer between presentation and other slides

Question: If you have tried or considered teaching climate change in your classroom, **what kinds of challenges have you come up against**?

Content (Personal knowledge, Curriculum Integration)

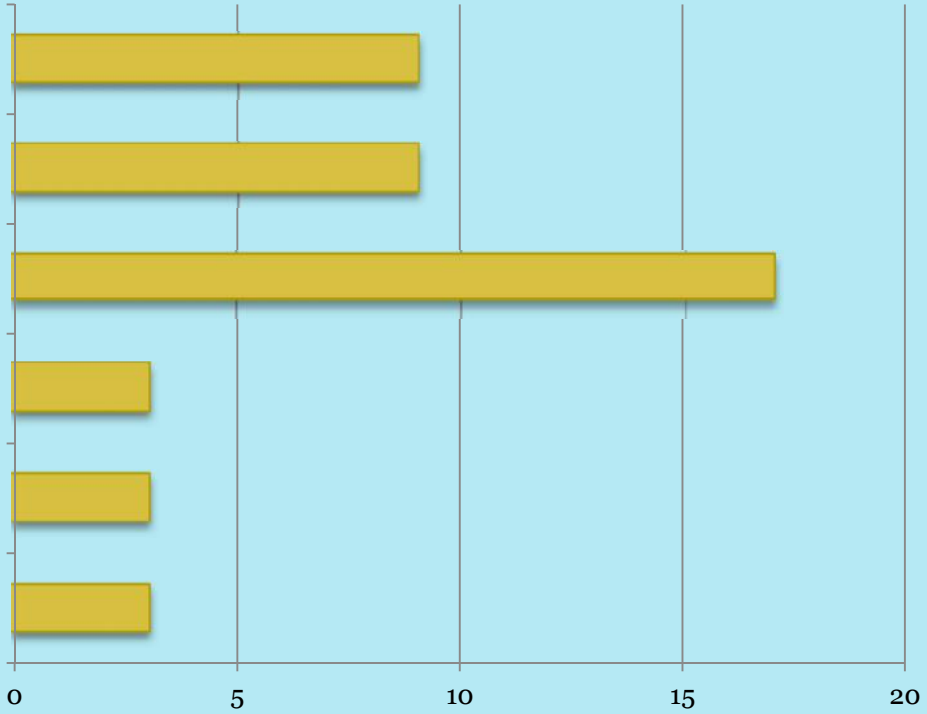
Lack of Resources

Controversy of Topic

Influence of Parents

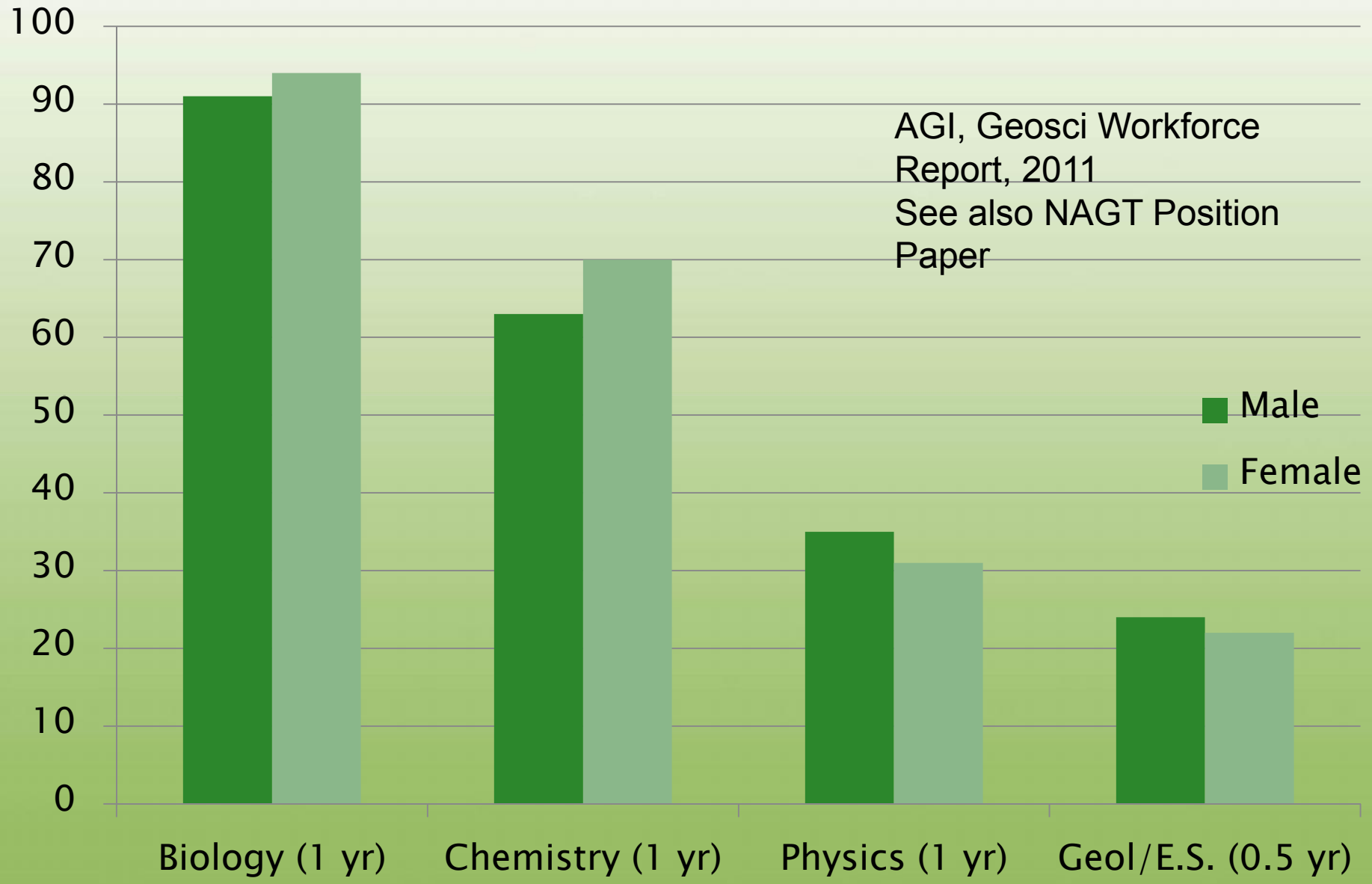
Lack of Teaching Time

Fatalistic feeling by students



Learnmoreaboutclimate survey among Colorado teachers 2011, N=53

Challenges: Earth Science in H. S.



AGI, Geosci Workforce Report, 2011
See also NAGT Position Paper