How well prepared are Science teachers to incorporate engineering design principles into their Science curricula?

Background

Incorporating engineering design principles into science curricula is part of the Next Generation Science Standards (NGSS) with an intended purpose of moving science education forward to the 21st century. This study examined teacher preparation, attitudes, and level of knowledge about the engineering design process and how it can be incorporated into their science curricula. Teachers were surveyed for their perceptions of and experiences with engineering concepts.

Research Questions

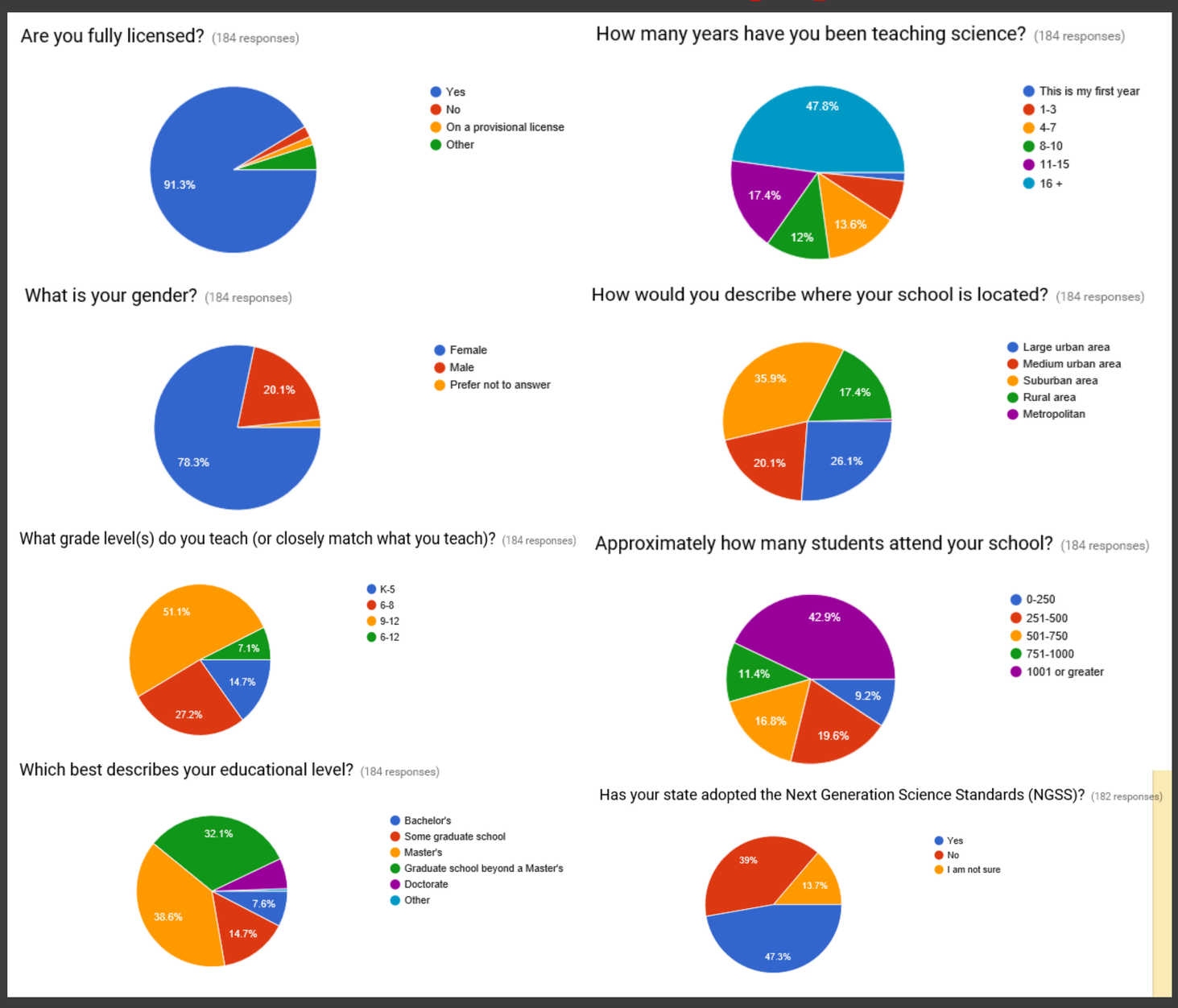
Focus Question

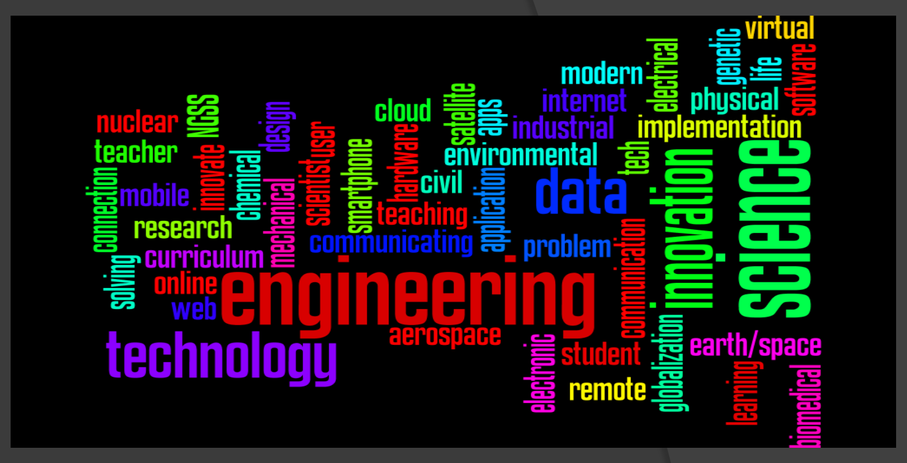
How well prepared are Science teachers to incorporate engineering design principles into their Science curricula?

Sub- Questions

1. How do teachers define the engineering process?
2. How relevant is engineering/engineering design to what a science teacher teaches?
3. Does professional development make a difference?

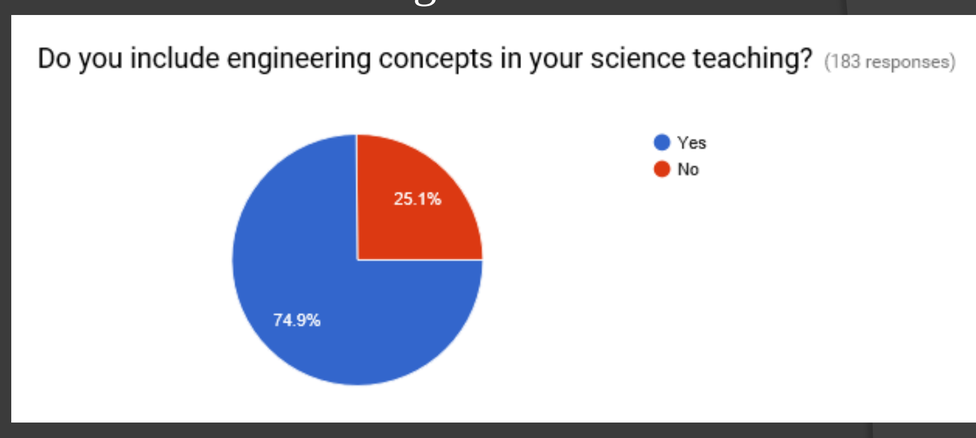
Data Collection - Demographics



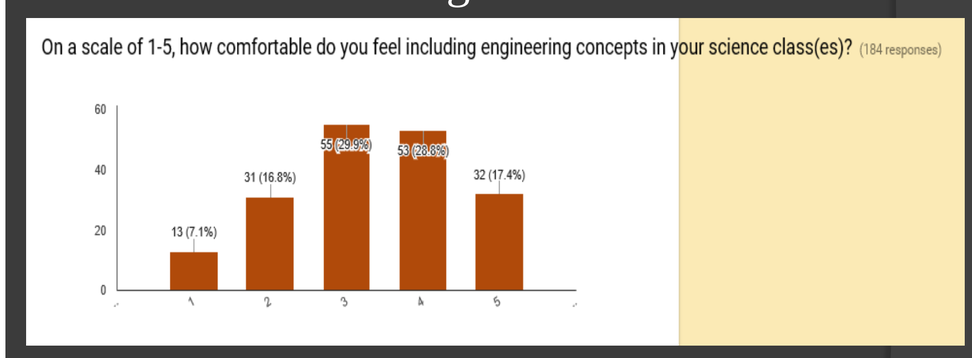


Data Analysis – Survey Questions

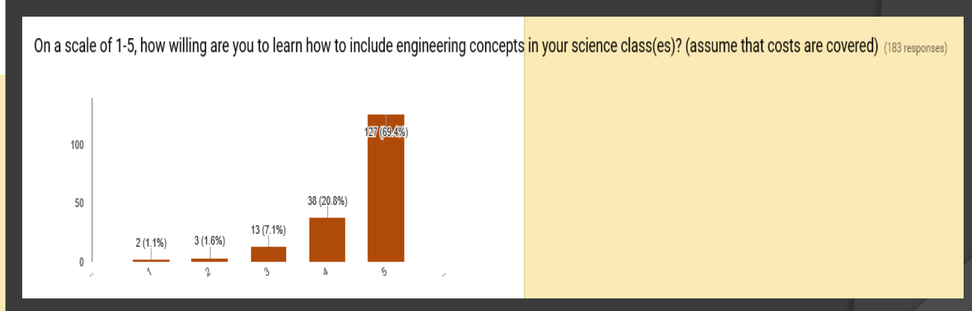
Teachers from 42 of 50 states plus 2 international locations responded to the survey. Most teachers felt comfortable teaching their discipline ($\bar{x}$ = 4.529 on a scale of 5). Just below half (43.5%) of the teachers have had either college coursework or professional development in engineering and just a few more – still less than half (45.7%) have college coursework or professional development in how to implement engineering concepts into their science curriculum. Almost 75% reported that they incorporate engineering concepts into their science teaching.



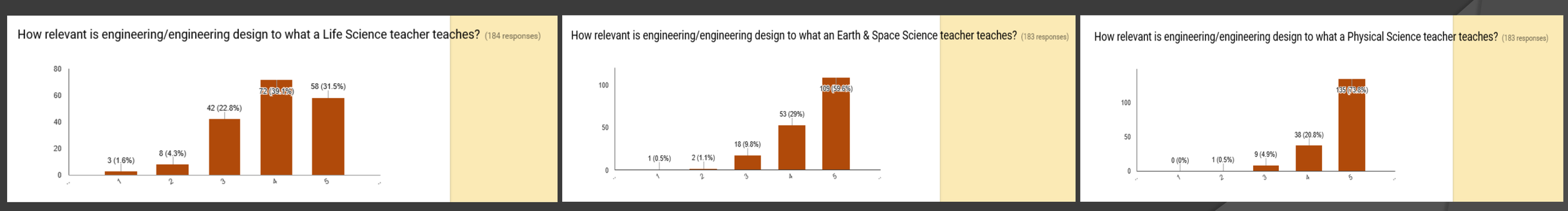
Although, an average of 3.318 on a scale of 5 felt comfortable doing so.



Most teachers were willing to learn how to include engineering concepts in their science classes ($\bar{x}$ = 4.558 on a scale of 5).



Where does that lead us? → Relevancy



Teachers were asked to rate how relevant engineering design is to each of 3 science disciplines (Life ($\bar{x}$ = 3.925 on a scale of 5), Earth/Space ($\bar{x}$ = 4.461) and Physical ($\bar{x}$ = 4.679))

Results

This study shows that there is room for improvement in science teacher preparation. Less than half of the science teachers surveyed have had formal education in engineering or implementing engineering into their science curricula and 70% of the teachers who completed the survey had a Master's degree or higher. Sixty-five percent have been teaching science for 10+ years. Most teachers reported that it is relevant to include engineering design in their teaching across disciplines. Best of all, teachers are overwhelming (98%) willing to continuously improve their craft given the opportunity.

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