

Initial Career Paths of Physics Bachelor's with a Focus on High School Teaching

(Results from Phase One)

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The following findings have been prepared at the request of the Physics Teacher Education Coalition project (PhysTEC) staff. The data primarily come from the Spring 2007 AIP follow-up survey of physics bachelor's in the class of 2006, but are also supplemented by other AIP data sources. Because these results are based only on the first year of the planned two years of data collection, these data should be considered preliminary and used with caution.

This report supersedes previous versions of these findings.

Background information from other AIP sources

HS teacher data from the High School Teacher Survey (2005)

The pathway to high school physics teaching is often not direct.

- Approximately 50% of the new teachers with a physics bachelor's delayed 3 or more years after receiving their bachelor's degree before becoming a high school physics teacher. This does not count individuals who delayed to first earn a master's degree.
- Each year, high schools hire about 2,750 physics teachers, but ~1,600 are transfers or experienced teachers coming back from a break. So, only 1,150 are brand new to teaching. About 270 of these new teachers have a bachelor's degree in physics, and another ~90 have a physics education degree. The remaining brand new hires (~790) have bachelor's degrees in a variety of subjects, mostly another science or math.
- Private schools hire a disproportionate percentage of new physics teachers. Some later transfer to the public sector.

16% of the students who take high school physics are at private schools.

22% of all high school physics teachers are at private high schools (smaller classes).

28% of new physics teachers are at private high schools.

Physics Senior Survey (preliminary results from seniors in the class of 2007)

For some, high school teaching is their goal, but for others, it is a fallback.

- Five percent of all senior physics majors aspire to high school teaching as their primary career choice. An additional 10% listed it as their secondary choice. Over half of these secondary choice individuals listed college teaching as their first choice.

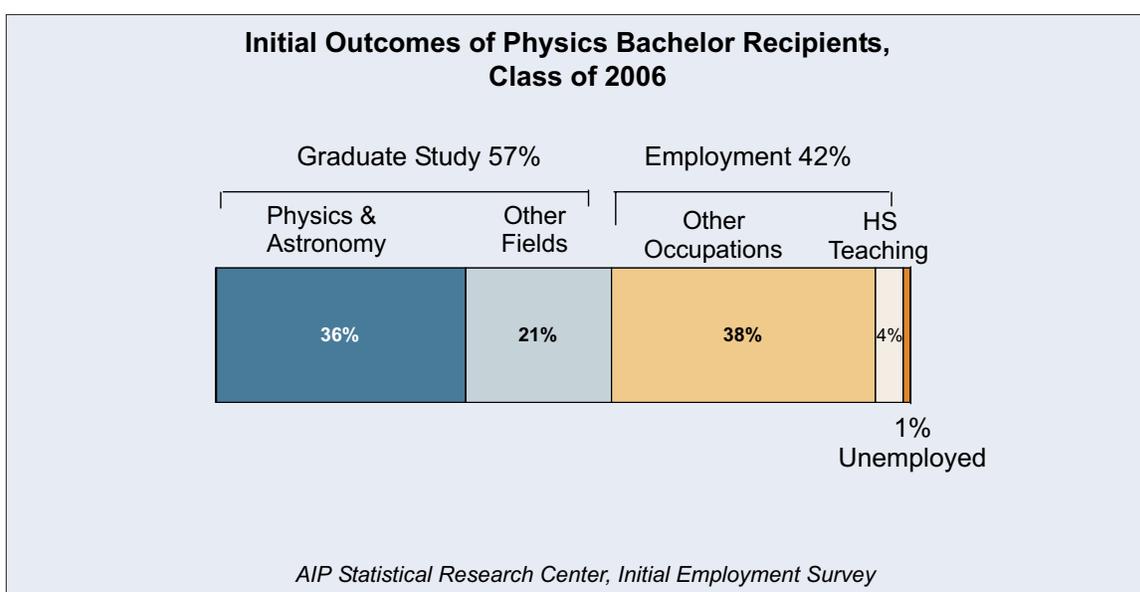
Enrollments and Degrees Survey (preliminary departmental level data)

- For the 2005-06 academic year, 37% of the physics departments reported that they had an education concentration for physics majors. The proportion with an active program is likely lower. Departments that reported having such a degree option indicated that 7% of their bachelor's received such a degree overall. About 2.5% of all bachelor's received such a degree - about 125 students per year.

Physics Bachelor's Follow-up Survey Results

Including data from the survey module directed solely to new high school teachers.

- The high school teacher data presented here are based on 59 responding individuals. There was a total of 1,474 respondents' to the 2006 follow-up survey of new physics bachelor's. Twenty-one respondents said they were working at an elementary or middle school and these are not included in the analysis of high school teachers below. There were a total of 5,373 physics bachelor's in the class of 2006.
- 4% of all physics bachelor's went directly into high school teaching after graduation.



- 10% of employed physics bachelor's went into high school teaching after graduation
- We estimate that a total of about 200 physics bachelor's in the class of 2006 immediately accepted high school teaching positions.

The majority of new teachers are teaching at least one physics course. Although they are teaching a variety of course types, the regular algebra/trig based physics course is the dominant type taught, as is true for high school physics teachers at all levels.

70% of teachers say they are teaching at least one physics course.

13% (7 respondents) are teaching only physics courses.

Types of high school physics classes being taught by new physics bachelors.

82%	Regular
26%	Conceptual
28%	Honors
18%	Advanced Placement (AP)

This table is based on the 39 respondents who were teaching at least one physics class. The total equals to more than 100% because individuals can teach more than on type of course.

- 2% of all responding physics bachelor's indicated their undergraduate degree had a high school teaching focus. About half of these immediately pursued high school teaching after graduation.
- One-quarter of the high school teachers indicated that their undergraduate degree had a high school teaching focus. Most of these had already earned their teaching certification.
- Of new bachelor's who are teaching high school, 28% are at private schools (This agrees with findings from the high school teacher survey).
- Most high school teachers are working full-time. About 1/3 of the high school teachers were also enrolled in graduate school (mostly as part-time students, many working toward certification)
- Only 2 of the responding high school teachers came from a PhysTEC institution, so no analysis can be done comparing PhysTEC to non-PhysTEC teachers and programs.
- Female physics bachelor's were significantly more likely to pursue high school teaching.

21% the physics bachelor's class of 2006 were women. (*Enrollments and Degrees Survey*)

38% of new physics bachelor's who became high school teachers were women (The percentage has been adjusted to correct for an overrepresentation of women in the follow-up survey).

Career guidance

- 62% of the physics bachelor's indicated receiving career guidance from their physics faculty. Those who become high school teachers were more likely to receive guidance than those entering other employment sectors, but less likely than individuals pursuing physics graduate study.

Who was encouraged to become a high school teacher?

- Those who ultimately became high school teachers received more of both encouragement and discouragement to pursue high school teaching as a career. This was probably because the issue was more likely to come up in the first place. On the whole, physics bachelor's received far more encouragement than discouragement. The fact that the same encouragement/discouragement ratio was obtained for those not pursuing teaching suggests that, overall, while teaching is low on the radar screen, there is not a widescale disparagement of teaching as a career option.

Faculty encouragement to pursue high school teaching as a career.				
		Encouraged	Discouraged	Neither
High school teacher	%	46	11	43
All other physics bachelor's	%	13	3	84

A high school physics course, specifically high school physics teachers play an especially significant role in engendering the next generation of high school physics teachers.

Most frequently cited influence for becoming a high school teacher.	
	Percent
A high school physics teacher	40
Employment opportunities in teaching	18
Parent	9
Friends or other students	*
A college professor	*
My introductory college physics course	*
Other	19

* Potentially unreliable. Represents fewer than 5 people.
 Write-ins for the individuals who checked other: Wanted to help the church school, Several high school teachers, I tutored kids for a while and found I really liked teaching people, Teachers in general, high school chemistry teacher, my experience as a college mathematics tutor, Personal Interest, Personal decision, combination, Teach For America, Being a parent.

New high school teachers were asked to comment on the most influential factor or person that caused them to become a high school teacher. The answers were interesting and varied.

❖ See open ended comments concerning influences in Appendix A.

The majority of new teachers had taken at least one teaching methods course.

Teaching methods courses (based on 59 respondents)

62% Had at least one teaching methods course taught outside the physics department.

24% Also had at least one teaching methods courses taught in physics department.

38% Had no teaching methods courses

Almost half of the high school teachers had already earned certification by the time they graduated.

Teaching certification of physics bachelor recipients in the class of 2006.					
		Have Certification	Don't have certification		
			Currently pursuing it	Plan to get it within 3 years	No plans for certification*
High school teacher	%	44	23	12	21
All other physics bachelor's	%	2	4	4	90

* During the next three years.

● Types of certification held or being pursued by new high school teachers: (based on 34 individuals)

68% physics

18% physical science

12% broad science

2% other

● The majority of new teachers without certification and with no short term plans of getting it are teaching at a private high school.

In general new physics bachelor's are pleased with their choice of major, including those who chose to go into high school teaching.

When asked if they would still major in physics again if given the opportunity.	
<u>Initial Outcome</u>	<u>Percent Agreeing</u>
High school teacher	93
STEM employment	88
Non-STEM	76
Graduate study physics	93
Other graduate study	87

STEM employment represents individuals who indicated they were working in the fields of Science, Technology, Engineering, or Mathematics. The STEM and non-STEM employment categories include all other sectors with the exception of elementary and middle schools.

The assessment of the job market encountered by new physics bachelor's varied somewhat depending on the post-degree pursuits of the degree recipient. Those choosing high school teaching were especially encouraged.

When asked if they were pleased with their employment prospects.	
<u>Initial Outcome</u>	<u>Percent Agreeing</u>
High school teacher	75
STEM employment	55
Non-STEM	46
Graduate study physics	56
Other graduate study	47

STEM employment represents individuals who indicated they were working in the fields of Science, Technology, Engineering, or Mathematics. The STEM and non-STEM employment categories include all other sectors with the exception of elementary and middle schools.

Satisfaction of new teachers seems especially high.

- Perceptions of new high school teachers about their current position compare favorably when contrasted with other employed new physics bachelor's. It should be kept in mind that the expectations of high school teachers for things such as "salary" and "opportunities for advancement" may differ significantly from non-teachers, affecting the satisfaction ratings they report.

- ❖ See Appendix B for comparisons of level of satisfaction focusing on various aspects of employment.

- Employed bachelor's were asked to indicate the frequency of use for knowledge and skills they may have acquired while an undergraduate. High school teachers indicated using their skills more frequently than other employed bachelors, with the exception of "advanced computer skills."

- ❖ See Appendix C for comparisons of frequency of specific skills used by type of employment.

Some degree recipients who accepted high school teaching positions indicated they did not plan to remain teaching for very long before continuing with other pursuits. For many of these, their attrition may have been planned, but others may have realized during their first year that high school teaching was not the career for them.

- 16% say this is their first and last year as a high school teacher. Two-thirds of this group plan on entering graduate study next year.

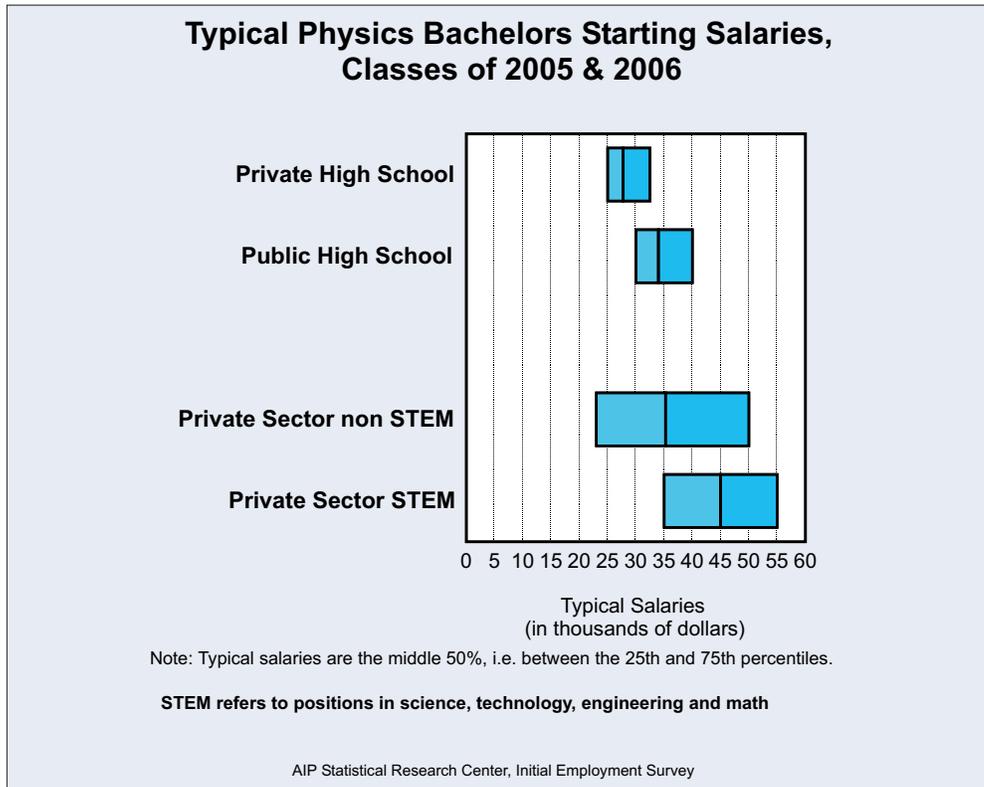
- An additional 28% of the high school teachers say they will not be teaching in 5 years. Two-thirds of this group indicated future plans of enrolling in graduate school.

- The majority of the teachers without certification and with no intention of getting it are not planning to be teaching high school next year.

- ❖ See Appendix D to read open ended comments concerning how long individuals are planning to remain a high school teacher.

There is a significant salary differences between teachers employed at public vs. private high schools.

- The median salary for individuals employed at a private high school was \$27,800 compared to \$34,000 for teachers at a public high school. The median starting salary for teachers in a public high school was similar to new physics bachelor's working in a non-STEM related jobs in the private sector (\$35,300).



Findings specifically from the non-teachers

- When we asked all non-teachers, “What influenced your decision not to go into high school teaching?”, low pay was by far the top reason. The following is a list of influences mentioned by non-high school teachers in order of the frequency they were mentioned.

Low salaries

Want to do research

Not interested in high school teaching

Have other interests

Don't want to work with kids

Want to go on to graduate school

The challenge of getting a HS teaching job

Want to teach college

HS teaching not challenging enough

Memories of own HS experience

Not enough opportunity for advancement

Apathy in HS environment

APPENDIX A

All responses to open ended comment following the question:

What was the most influential factor or person that caused you to become a high school teacher?

- I had an awesome high school physics teacher who was great at simplifying what seemed impossible
- I also wanted to step back from research before jumping into graduate school.
- Teaching in an low income community. My h.s. teachers were important- should be the same everywhere.
- Students tend to dislike physics, partly b/c of their teacher, and I hoped to change that
- Was told "high need for science teachers" (Not true, BTW.) Several teachers throughout my school career
- Mr. (Teacher) was so fun and amazing...I wanted to inspire future generations like he did.
- I loved tutoring. I thought teaching would be similar. It is not.
- My high school physics teacher drew me to physics in college and, later, into teaching physics
- I was inspired by a HORRIBLE physics teacher in high school!
- It sort of fell into my lap and I found the idea to be somewhat interesting and decided to try it.
- He taught me to see the world
- Teaching interviews were much more fun than engineering interviews -- I felt wanted/needed.
- I wanted to be able to spend more time with my family and touch young lives.
- Lots of positions, but only one in physics
- When I saw how poorly it can be taught, I was inspired to do it right.
- I found out about Teach For America my senior year and applied.
- I've always wanted to be a teacher - my high school physics teacher made me want to teach high school
- placed high emphasis on education and the ability to help others
- I enjoyed his class and related to him, i wanted to pass that on to others

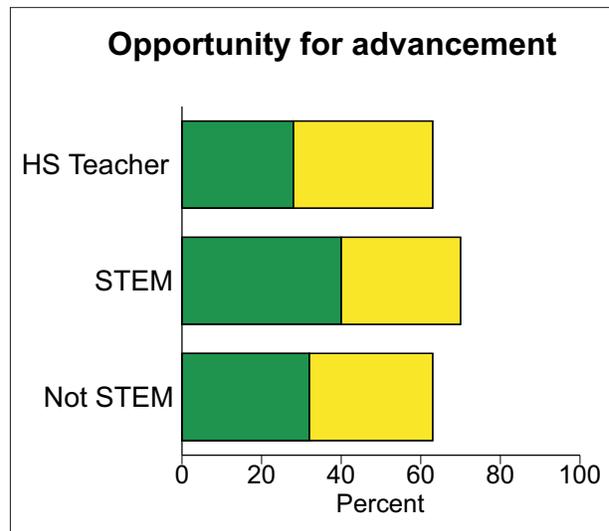
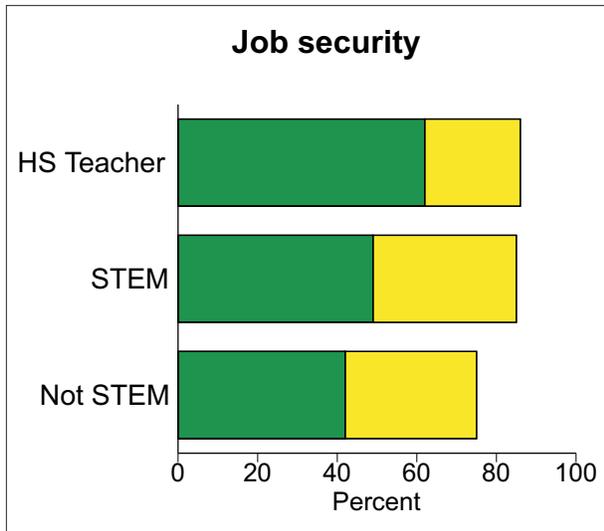
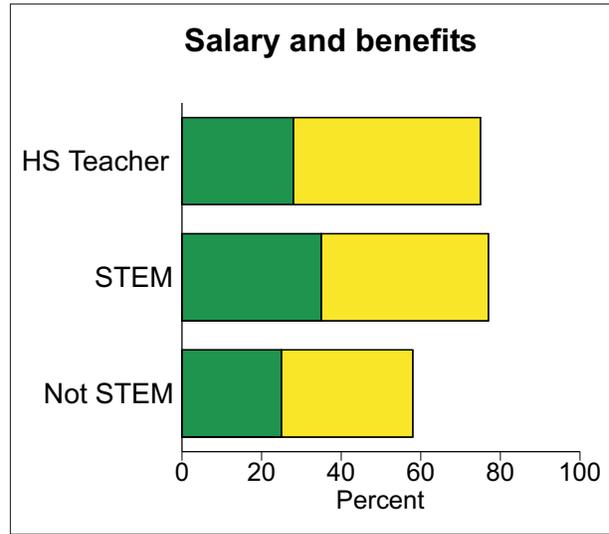
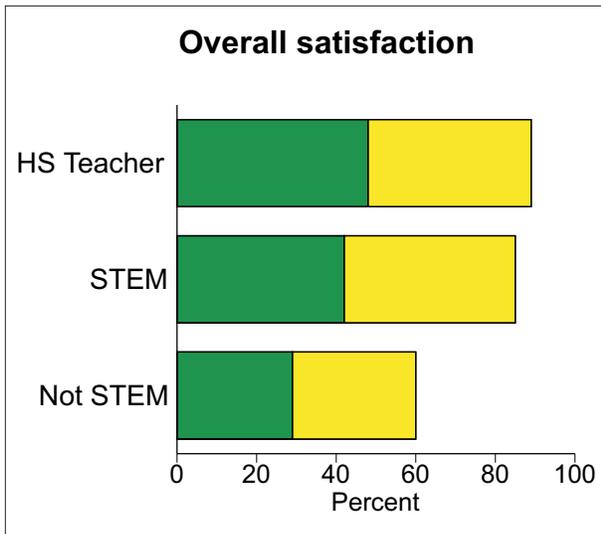
- Job security, benefits, summers Off
- Academic Support Staff Encouragement along with Employment Opportunities
- Role models were high school physics teacher (AP physics B, C, also geometry), math teacher
- Mr. (Teacher) was amazing
- (My) physics department is amazing! They made it interesting!
- I enjoyed the interaction of studying with friends and that helped me realize I wanted to teach.
- My high school physics teacher rules
- I love Physics and I love working with students, so I combined them with teaching
- Science Teaching positions are in great demand. It will also allow me to easily transition back into
- I really feel that many of these people contibuted but I was inspired by a Junior College Teacher.
- Substitue teaching was one of the few jobs I qualified for with my degree

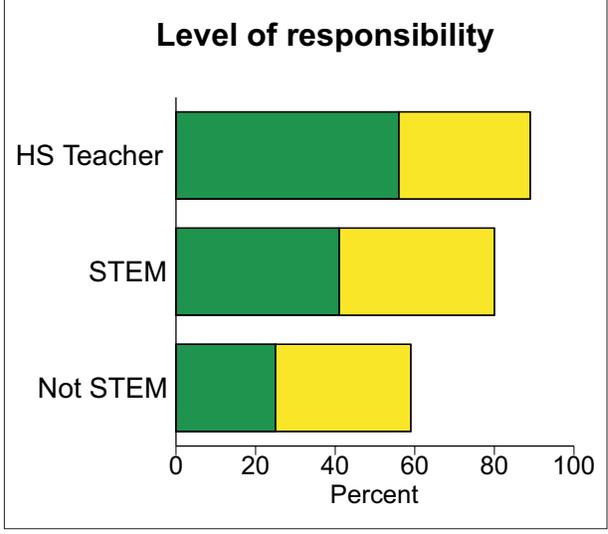
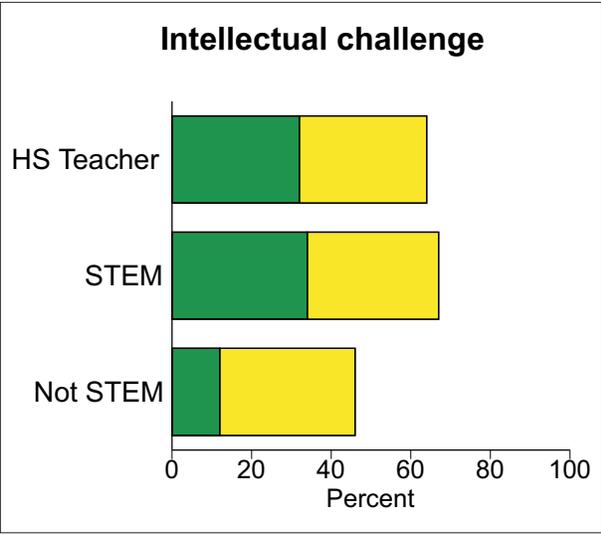
APPENDIX B

Are you satisfied or dissatisfied with this position?

Choices were: Very satisfied, Somewhat satisfied, Somewhat dissatisfied, and Very dissatisfied

STEM refers to positions in science, technology, engineering and math. STEM and non-STEM employment includes all other employment sectors with the exception of elementary and middle schools.



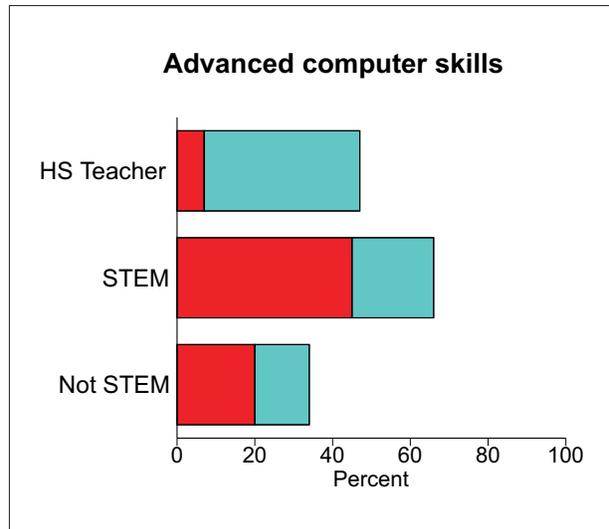
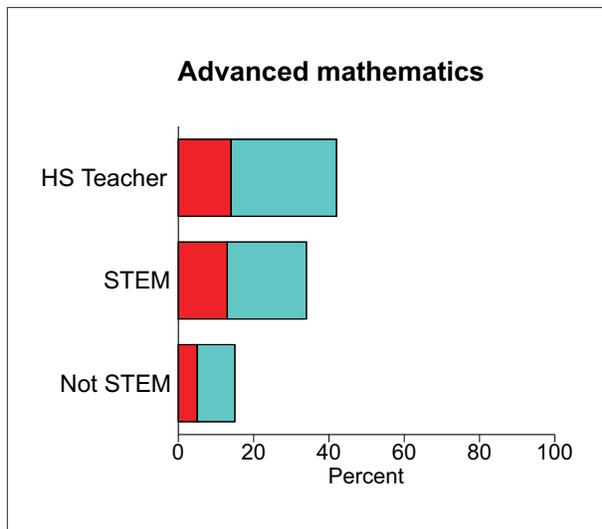
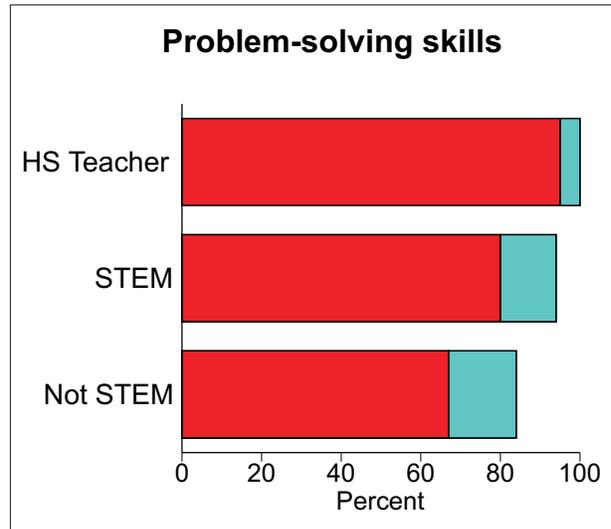
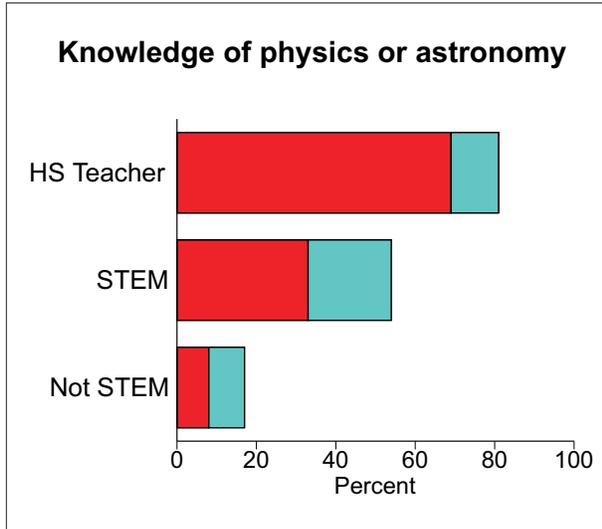


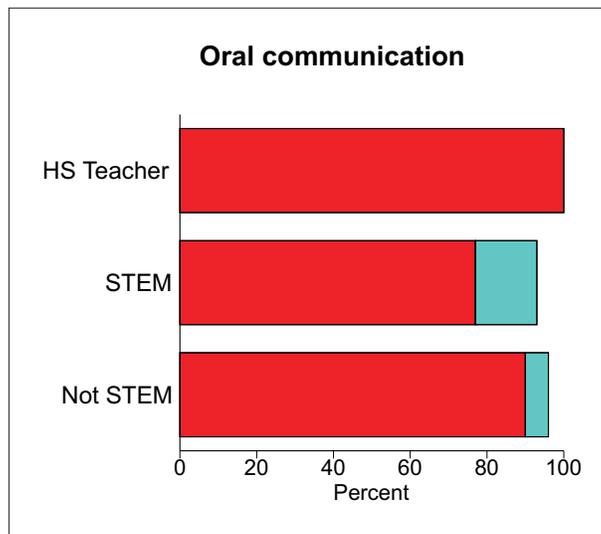
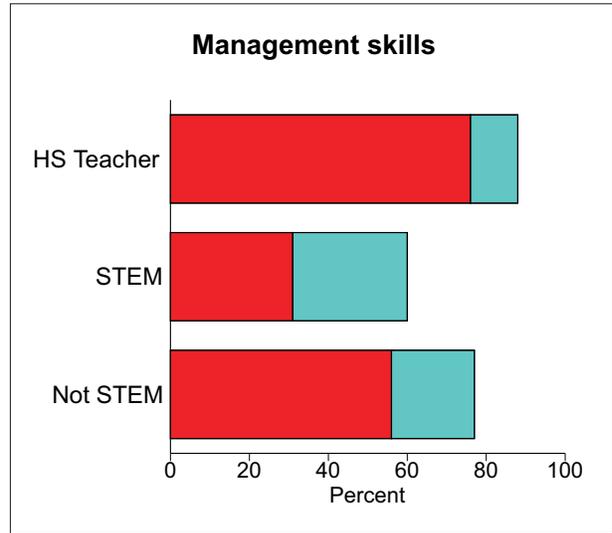
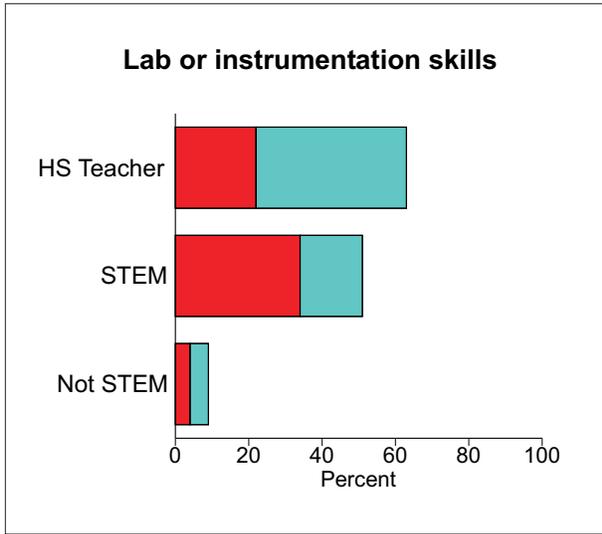
APPENDIX C

How often do you use each of the following in your position?

Choices were: Never, Monthly, Weekly, and Daily

STEM refers to positions in science, technology, engineering and math. STEM and non-STEM employment includes all other employment sectors with the exception of elementary and middle schools.





APPENDIX D

All responses to open ended comment:

How long are you planning to remain a high school teacher?

This is my last year

I will be attending graduate school this fall.

One year is all I need to realize that I need to go back to school for my PhD.

Since I am a foreign citizen, I was unable to stay in this field for next year. back to g school.

Want to find a job in industry to prepare for graduate school

I'm getting the hell out of there

On to bigger and better things

1-5 more years

High school teaching seems to be my preferred career, but I will be more sure with more experience.

I am under contract for next year, then plan on attending graduate school.

I have a two year commitment with Teach For America (TFA)

My program (poebably TFA) is 2 years

I'm in TFA, which is a two year program, I will probably teach a third year.

I would like to go to graduate school and take off time to have a family

2 more years to help pay off school loans and save money for graduate school

I'll be teaching conceptual, regular, and AP physics from now until June, 2008.

I will need to advance my education and change career paths to meet my financial goals.

After a few years I may finish an engineering degree or get my masters in education

6 or more years

I want to teach my kids

APPENDIX D Continued

I am keeping my options open

Feel my best chances for job security are in education.

As long as I can take it!

I love my job!

I'd like to teach for 10 years, then I intend to work on the college level.

I see this as a career, though I will likely take some time off to have children until they're 6.

Until i feel i am experienced enough to move into admin

I plan to make this my career

Just started, planning on getting more physics courses as they did not exist before

Need certification -- 2 more years. Want loans forgiven – 5 more years. Then find a private school.

This is my career

I just graduated, but I am 37 years old. I will need to teach at least 25 years before retiring.

I plant to teach to retirement.

If I were to do something else, it would be engineering.

I intend to stick with this profession