

## Appendix F: Survey Data and Related Discussion

A multiple choice survey was administered to all field semester interns every semester from Fall 2004 through Spring 2007 to ascertain the type of activity occurring in the different sections of the course, as well as to determine if there had been any course improvements after Fall 2004. The PhysTEC team had not attempted to make any curricular changes to the course in Fall 2004 (except in Dr. Lising's section), and so the Fall 2004 results represent the baseline data for the course before any significant PhysTEC-related course improvements were instituted. The results of this ongoing survey are presented in Table 1.

Table 1

Field experience course activity: Fall 2004 (Baseline) through Spring 2007

	Baseline (89 interns)	Spring 2005 (108 interns)	Fall 2005 (75 interns)	Spring 2006 (93 interns)	Fall 2006 (56 interns)	Spring 2007 (105 interns)
Interns who observed their mentor teacher teaching 4 or more times	19%	18%	9%	1%	2%	3%
Interns who taught fewer than 4 times	28%	11%	0%	2%	2%	1%
Interns who indicated that their lessons were primarily official school activities implemented as written	20%	10%	20%	2%	0%	3%

As demonstrated in Table 1, in comparing each subsequent semester's data to the Fall 2004 baseline data, our PhysTEC project continues to be extremely successful in (a) decreasing the number of times that the practicum interns observe their mentor teachers, (b) increasing the number of times that the interns teach science, and (c) increasing the number of lessons that are adapted lessons rather than unmodified lessons. For example, the percentage of interns who taught fewer than four times in Spring 2005 (11%) is significantly less than the percentage of interns who taught fewer than four times in Fall 2004 (28%),  $\chi^2(1) = 9.2, p < 0.01$ . Likewise, the percentage of interns who implemented unmodified activities in Spring 2006 (2%) is significantly less than the percentage of interns who implemented unmodified activities in Fall 2004 (20%),  $\chi^2(1) = 15.2, p < 0.001$ .

The responses about the interns' experiences in the course are most sensitive to the different ways in which a given section was run by the instructor, but also reflect some differences within sections due to different approaches/allowances of the mentor teachers and different circumstances or choices of the interns. These data reflect the degree to which the interns' experiences deviate from those outlined in the course goals, which were developed and made explicit for the first time as part of our project activity. Overall, these data show a general trend toward diminishing numbers of unfavorable experiences, going to almost zero after two years of project activity. This is a significant success of our project. As a result of PhysTEC-driven reforms, the interns spend less time observing and have more opportunities to teach and modify lesson to be more inquiry-oriented.

Several other interesting things can be noted from this data. Firstly, it is interesting to see the timescale over which changes were made. Although prior to Fall 2004 we had made the course goals explicit with both instructors and mentor teachers and continued to reinforce these each semester, the changes still took some time to occur. Most changes occurred by whole sections, which indicates the sensitivity of the outcomes to both instructor and placement school environments. This also explains the fluctuation in the data about modification of activities. From our the TIR observations of the sections and from comments the mentor teachers and instructors made in end-of-year reflections we learned that the mentor teachers at one placement school (call this school A) were opposed to lesson modification. This accounts for much of the 20% of unmodified lessons in Fall 2004 and Fall 2005 (see Table 2, below), as well as nearly all of the 10% in Spring 2005. The drop of 10% from Fall 2004 to Spring 2005 is almost entirely due to there being one extra section at a new school with teachers that accepted modifications. Fall 2005 had fewer sections again and included school A, so the numbers then increased.

Table 2. Distribution of survey responses for “curriculum modification” question, by section, for Fall 2005.

Section/ School	Mostly implementing as written	Mostly modifying	Mixture of both
A	14	0	2
B	0	6	9
C	0	6	12
D	1	2	9
E	0	7	7
Total	15	21	39

Survey Results: Attitudes Toward Science and Science Teaching

Starting in Fall 2005, all field experience interns have been assessed with Likert-scale items (strongly agree, agree, neutral, disagree, strongly disagree) about their attitudes toward science and science teaching. Tables 2-5, below, show the data for these survey items. The interns’ “strongly agree” and “agree” responses have been combined (under “agree”) and the interns’ “disagree” and “strongly disagree” responses have been combined (under “disagree”).

Table 2

Attitudes Toward Science and Science Teaching: Fall 2005

Statement	Pre (80 students)			Post (75 students)			Chi-square
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	
Some students have a natural talent for science, and some do not	47%	40%	13%	40%	28%	32%	7.8, $p < 0.05$
The idea of teaching science scares me.	19%	26%	55%	8%	20%	72%	5.7, $p > 0.05$
I like science.	61%	21%	18%	77%	17%	5%	6.7, $p < 0.05$

Table 3

Attitudes Toward Science and Science Teaching: Spring 2006

Statement	Pre (109 students)			Post (93 students)			Chi-square
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	
Some students have a natural talent for science, and some do not	38%	38%	24%	1%	11%	88%	64.4, $p < 0.001$
The idea of teaching science scares me.	19%	25%	56%	9%	12%	79%	5.7, $p > 0.05$
I like science.	54%	29%	17%	74%	12%	4%	6.7, $p < 0.05$

Table 4

Attitudes Toward Science and Science Teaching: Fall 2006

Statement	Pre (56 students)			Post (55 students)			Chi-square
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	
Some students have a natural talent for science, and some do not	38%	39%	23%	34%	35%	31%	0.84, $p > 0.05$
The idea of teaching science scares me.	29%	73%	38%	4%	20%	76%	20.0, $p < 0.001$
I like science.	56%	30%	14%	69%	26%	5%	3.3, $p > 0.05$

Table 5

Attitudes Toward Science and Science Teaching: Spring 2007

Statement	Pre (105 students)			Post (105 students)			Chi-square
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	
Some students have a natural talent for science, and some do not	42%	29%	29%	20%	39%	41%	11.8, $p < 0.01$
The idea of teaching science scares me.	31%	27%	42%	3%	10%	87%	50.5, $p < 0.001$
I like science.	57%	27%	16%	78%	21%	1%	18.4, $p < 0.001$

One particularly interesting shift is the positive, statistically significant pre/post shift in the percentage of interns who like science, which occurred in three of the four semesters. Another interesting result is the encouraging pre/post shift in the degree to which the interns were scared by the idea of teaching science. This shift was statistically significant in two of the four semesters. Finally, interns from three of the four semesters shifted significantly (toward smaller percentages) in their belief that the ability to do well in science is a natural ability.