Introduction

Physics education researchers have developed many successful research-based instructional strategies (RBIS). However, there is a concern that instructors are not readily adopting them or implementing them effectively.

Much of the previous work on familiarity and usage of RBIS has focused on college instructors exclusively. In this study, college and high school instructors were surveyed.

• Does attending physics education conferences or reading physics education journals impact instructors’ likelihood to use RBIS?
• Do daily interactions with colleagues provide more of an impetus to use or not use RBIS?
• How do conferences, journals and daily interactions affect the balance of student-student vs. student-teacher interactions in a classroom?
• Do attitudes and beliefs such as intrinsic interest, motivation, incremental/entitative view of learning, etc. correlate with classroom practices?

Methods

63 high school and 55 college physics instructors from Southern California completed a voluntary web-based survey.

The survey consisted of 99 items, including:
• Instructor demographic characteristics
• Familiarity and usage of research-based instructional strategies (RBIS)
• Description of classroom practices
• Frequency of interactions with other teachers and researchers
• Beliefs about teaching and learning

Rating scale types included five-point Likert scale and five-point scale akin to a semantic differential scale. The five-point scales were generally collapsed into a three-point scale in the analysis.

The RBIS were sorted into the following groups:
• Whole course
• Lecture
• Lab
• Assessment

RBIS familiarity was based on the number of “encounters” (none (0), partial (1), complete (2) and able to lead encounters (3). An “encounter” can be watching it in action, conversing with a colleague who is experienced with the item, attending a seminar presentation or reading a journal article.)

RBIS usage was scored none (0), partial adoption or adaptation (1) or complete adoption (2).

The portion of class devoted to student-student interaction was also computed using a breakdown of class time. Time devoted to assessment and formal labs was removed from the total.

Effects of Community


For college teachers, those who attend more conferences or read more journals do claim to be more familiar with most RBIS.

Neither group of instructors show a correlation between interactions with the physics education community and the portion of their class devoted to student-student interaction.

Intrinsic Interest

Among both populations, there appears to be considerable intrinsic interest in improving teaching. The following cluster of statements was on the survey:

• Understanding what is the best way to explain physics is important to me.
• I like to teach.
• I think that learning how students learn is interesting.
• I like learning the most effective ways to help students learn.

An average intrinsic score was computed by assigning agree and strongly agree answers a +1, disagree and strongly disagree answers a –1 and neutral a 0. All of the high school teachers had an average score 0.75 or above, with 92% agreeing with all four statements.

The college teachers were also positive, but with a slightly lower average. 11% had an average less than 0.75. For those in this small group, their average fraction of time devoted to student-student interaction was 0.093.

Several Likert questions on the survey attempted to examine instructors’ relationship with their “local teaching community.” T-tests were performed, comparing the practices of those who disagreed with each statement to those who agreed with it.

Responses from the college teachers indicated that there is greater RBIS usage when there are collaborative relationships. Both groups showed greater student-student interaction with more collaborative relationships.

Years Teaching

The amount of student-student interaction depends strongly on a teacher’s career length. A dramatic reduction in interactivity is noticed in both high school and college instructors.

Conclusions

The different relationships between the distal learning community and the local learning community suggest that new approaches to encouraging transformation of classroom practices may be needed. Rather than trying to educate and persuade individual teachers via publications or presentations, a systemic approach that includes social interactions of colleagues would be beneficial. By helping schools and departments change their cultures there may be a greater shift in teaching practices.

On the individual scale, beliefs and values, such as intrinsic motivation, do correlate with a teacher’s classroom practices. Again, simply educating teachers about the options and the logic and evidence supporting them, is not sufficient. Teachers’ motivation needs to be addressed, without it no amount of information will change their classroom practices.

A shift toward greater student-student interactivity in the classroom may already be happening as suggested by the correlation with the number of years an instructor has been teaching. There may already be a transformation among physics instructors that is beginning with those at the onset of their careers. To study this issue, we hope to deploy the survey repeatedly over the many years.

There are some clear differences between the classroom practices of high school and college teachers and their activities outside the classroom and attitudes. This, and other issues such as teachers’ self-regulation, views of learning, will be studied in follow-up interviews.