Physics Faculty And Educational Researchers: Partners In Reform

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Introduction

In recent decades, physics education research (PER) has developed substantial knowledge about the teaching and learning of physics as well as research-proven instructional strategies and materials based on this knowledge. Yet, the majority of university-level instruction remains traditional. It is common for the lack of wide-scale reform to be attributed to faculty characteristics (e.g., faculty are interested in research, not teaching; or faculty believe that they are effective teachers and, thus, see no reason to change). While these sentiments are not completely unfounded, we were dissatisfied with the “it’s the faculty” explanation of slow reform.

To begin to better understand this problem from a different perspective, we conducted exploratory interviews with a sample of five senior physics faculty who represent highly likely users of educational research. These faculty were highly interested in teaching, motivated to change, and familiar with many of the new teaching ideas. This purposeful sample (as opposed, for example, to a random sample) of faculty was chosen because identifying and reducing the barriers to reform for those faculty most likely to change seemed to us like an important aspect of any reform agenda.

These interviews identified two significant types of barriers: divergent expectations between faculty and educational researchers and situational constraints. This article will focus on the first. Unlike situational barriers which are built into the structure of the educational system and, thus, likely very difficult to change, the barrier of divergent expectations can be changed when both groups decide to change their interactions with one-another. More complete results of this study can be found in references 1-3.

As will become apparent later in this article, one of the important features of the way that the PER community currently interacts with other physics faculty is that the interaction is often perceived by both parties to be a one-way transmission of information. In this mode of interacting, the PER community is seen as developing knowledge about effective teaching and then using various methods, such as talks, articles, books, published instructional materials, etc., to transmit this information to other physics faculty.

Divergent Expectations

As expected, all of the faculty we interviewed believed that they faced instructional problems that could potentially be improved via changes in their instructional practices. They were also aware of research-based instructional innovations that might be useful for solving the problems. For example, they were all able to describe the names and basic practices involved with several instructional strategies based on physics education research.

Also, as expected, they all reported making various changes in their instructional practices throughout their teaching careers. When making these instructional changes, however, most of the research-based resources and knowledge were not used. Why would these faculty not make use of these PER results that are readily available? During the interviews it became apparent that these faculty had problems with some of the results of education research, and also with the way in which research practitioners disseminated these results. Many of these faculty expressed great frustration with this situation. In the following we describe three themes that emerged from the interviews related to the interactions between researchers and the instructors.

Theme I. PER is perceived as dogmatic

The interviewed faculty tended to see educational researchers as not really interested in them or their students, but rather as promoting a particular curriculum. Faculty also criticized educational researchers as promoting their instructional package or technique with the expectation that it
will work well in any environment, even ones quite different from the one in which it was developed.

**Theme II: Perception that PER Says I’m a Bad Teacher**

The PER community has put much effort into discrediting traditional transmissionist instructional approaches. For example, it is common for PER researchers to compare research-based instructional innovations to more traditional lecture-based approaches, with the innovation being shown to be superior. The faculty we interviewed described emotional reactions to this message. They saw educational researchers as insinuating that they are bad teachers: “The first word out of their [a typical PER presenter] mouth is you’re not doing things right.”

These faculty care about their students and an important part of their identity is their role as a teacher. It is difficult when they perceive that the PER community is telling them that they've been doing it all wrong and perhaps even causing harm to their students. Not unexpectedly, their reaction can be defensive. They want their expertise and experiences to be respected.

**Theme III: Faculty Want to Be Part of the Solution**

As a result of the way that these faculty perceive their interactions with educational researchers, they may not make full use of research-based findings. They recognize that research has something to offer. Yet, they feel a need to be part of the solution. As one interviewee said “I’ve spent my life doing this [teaching] and part of my teaching is in fact to be aware of all of the things that are going on [in educational research], but I want it to be useful and meaningful to that discourse.”

What most of the instructors appear to describe as a desirable situation is some degree of cooperation with PER researchers where the PER researcher will work with them to decide on instructional practices that fit their individual situations. This would be based on the instructors’ knowledge, skills, preferences, and teaching situation as well as on the available research knowledge about teaching and learning.

**Conclusion**

We have identified a potentially widespread mismatch between the expectations of educational researchers and traditional faculty that may be an important barrier to the spread of reformed instructional practices. This mismatch in expectations often leads to distrust and lack of cooperation between the two groups. Reformed instruction is necessarily instruction that in some way challenges the status quo and making the change means overcoming both personal and situational resistance. The results of this study suggest that the partnership model of reform offers a greater likelihood of success than the currently dominant transmission model.

**References**


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