



Establishing and Maintaining the Partnership with the School of Education

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While the number of high school students taking physics in the United States has been increasing rapidly, only 35% of high school physics teachers have a degree in physics or physics education [1]. Despite this severe, long-term shortage of qualified physics teachers, the Task Force on Teacher Education in Physics (T-TEP) reported that few physics departments and schools of education are engaged in the preparation of physics teachers, and physics teacher education programs in the U.S. produce few graduates [2]. Since 2001, the Physics Teacher Education Coalition (PhysTEC) has directly engaged physics departments in preparing physics teachers and provided funding to selected sites to develop national models to increase the number of highly qualified physics teachers. Unfortunately, building a robust partnership with the school of education is a challenge commonly faced by the PhysTEC sites. Because the California State University Long Beach (CSULB) PhysTEC project has built and maintained a very successful partnership, we hope to aid physics departments considering a partnership with the school of education by describing the key characteristics of our education faculty partner.

Secondary science teaching licensure is a post-baccalaureate program in California, and the science departments at California State University Long Beach (CSULB) have traditionally been detached from science teacher education. Prior to the PhysTEC grant, the Physics and Astronomy Department was no exception. Our physics BA degree designed for future secondary teachers graduated less than one student per year and the major advisors directed anyone interested in teaching to the single-subject credentialing advisor in the Science Education Department. CSULB is unique in that the Science Education Department, which is responsible for teaching science methods courses, resides in the College of Natural Sciences and Mathematics (CNSM). Since the Science Education and Physics departments are in the same college, we were able to quickly identify the perfect partner in the College of Education: Dr. Laura Henriques, the Chair of the Science Education Department. She brought practical knowledge of state licensure as well as experience working with pre- and in-service teachers, the College of Education, and the California State University system in science teacher education. A former high school physics teacher herself, she is a tireless advocate in making the CSULB PhysTEC activities relevant to pre- and in-service physics teachers.

By drawing upon our experiences, we have made a list of characteristics needed for a partner in the school of education. Firstly, the partner must have in-depth knowledge of state credentialing and have experience in implementing the licensure requirements at the university. Teaching licensure is governed strictly by the state, and the credentialing program in each institution has a history and tradition that need to be honored. An ideal candidate is an established faculty member respected both by the school of education and the physics department who can guide the PhysTEC project in the early years. At CSULB, PHYS 491 *Pedagogical Content Knowledge (PCK) in Physics* was developed and offered as an upper division elective in the physics department due to the difficulty of getting the course approved as a science methods course in the credentialing program. By not pursuing the credential curriculum process, we were able to design PHYS 491 as a true physics PCK course without credentialing restrictions. PHYS 491 was offered in the first



CSULB Physics Department mixer: Galen Pickett (Physics Co-PI), Laura Henriques, Kevin Dwyer (TIR) and Chuhee Kwon



California Science Teachers Association meeting. Katie Beck (TIR), Chuhee Kwon, and Laura Henriques

semester of the grant (Fall 2010) and has now been taken by 37 students including future teachers, physics majors, physics and science education MS candidates, and in-service teachers. With Dr. Henriques' guidance, the CSULB PhysTEC project demonstrated an early commitment to improving physics teacher education.

Secondly, the partner in the school of education must have a passion for supporting high school physics teachers, preferably as a former high school physics teacher himself/herself. Because most high schools have a single physics teacher who teaches a mixture of physics, math, and other sciences, he/she is often professionally isolated, so having an education partner who understands the needs of those teachers is crucial.

In addition, a faculty member with an established connection to local high school science teachers is preferred. Dr. Henriques served as the secondary science credentialing coordinator for a decade and is still involved with some of the advising of prospective secondary teachers. She also keeps in touch with many alumni and teachers who participate in professional development opportunities, runs listservs for science teachers and the Association of Future Science Educators club, and currently serves as the President of the California Science Teachers Association. By tapping into her personal connections with the local science teachers, we have gained a network of potential physics teachers to participate in our PhysTEC project.

Above all, a partner must share the common goals of the program. At CSULB, we wanted to improve our physics teacher education, to establish a robust pathway for physics majors to become teachers, and to build a physics teaching network involving in- and pre-service teachers, majors, and physics faculty. Our shared goals and mutual respect have helped the CSULB physics department establish and maintain a successful partnership with the school of education.

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1. Casey Langer Tesfaye and Susan White, High School Physics Teacher Preparation (American Institute of Physics, College Park, MD, 2012). Available at: <http://www.aip.org/statistics/reports/high-school-physics-teacher-preparation>.
2. Transforming the Preparation of Physics Teachers: A Call to Action. A Report by the Task Force on Teacher Education in Physics (T-TEP), (American Physical Society, 2012). <http://www.phystec.org/webdocs/2013TTEP.pdf>

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