# Bringing AP® Physics to Underserved Populations
# Project Accelerate - A Blended Small Private Online Course

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## 1. The Problem

**Access to AP® Physics:** Underserved high school students, especially among low income students, in many urban, rural, and small suburban communities don't have access to Advanced Placement Physics. Lacking this opportunity these students are hard pressed to compete with their peers who enter STEM programs in college from schools offering AP Physics.

## II. The Need

**Diversity of the STEM Workforce**: There is a critical need to develop STEM competencies among youth from demographic groups underrepresented in the STEM workforce. While underrepresented youth make up more than 50% of today's high school population, African-American/Black and Hispanic/Latino youth each comprise only 7% of STEM graduates and 6-7% of the STEM workforce.

Evidence exists that students who score 3 or higher on AP exams have greater success in college than students who did not take an AP course. The most recent reports indicate schools with predominately low-income students lag in offering AP courses by a 2 to 1 margin.

**Community Building**: September kick-off dinner, information sharing and some fun demonstrations. This was one of three such planned community building gatherings with the BPS students, liaisons and parents.

## III. Project Accelerate – A Scalable Solution

**A College Board (CB) Accredited Course**; Project Accelerate brings AP® Physics 1 to schools that do not offer AP® Physics as part of their regular program of studies. There is no cost to the school and no cost to the student except the CB test registration fee.

**A Partnership between Boston University (BU) and Individual High Schools:** The course blends together the supportive infrastructure of the student's home school with a private (invitation only) edX online course designed specifically with high school students in mind.

**HS and University Liaisons**: Partner schools select a staff member as HS liaison to facilitate communications between the partner school and the university. The partner school staff does the vetting of potential students. Each participating student is assigned by their school a time during the day to work on the online program. The university liaison provide the school with regular progress updates, midterm reports and end of term grades which are then entered into the student's home school permanent record.

**Online Forum and University Recitation/laboratory Support**: The online program includes a built-in online forum where students engage in discourse, pose questions and provide help to other students who form this community of physics learners. Students within commuting distance of the university campus engage in once-a-week 2-hour small group hands-on laboratory sessions led by undergraduate Teaching Assistants and supervised by the university liaison.

| General Group Description | Specific Group Description | No. of Students | % Score 1 & 2 | % Score 3, 4 & 5 |
|---|---|---|---|---|
| AP® Physics 1 Students Not Enrolled in Project Accelerate | Nation (white) | 83,702 | 54 | 46 |
| | Nation (black and Hispanic) | 39,402 | 84 | 16 |
| | Massachusetts PS (non BPS) | 3398 | 57 | 43 |
| | Boston PS (non Project Accelerate) | 151 | 92 | 8 |
| AP® Physics 1 Students Enrolled in Project Accelerate | Massachusetts PS (non BPS) | 7 | 29 | 71 |
| | Boston PS | 14 | 86 | 14 |

*Table 1: Outcomes - Massachusetts' data obtained from mass.gov 2016 Department of Elementary and Secondary School website. National data from College Board, 2016.*

## 1V. Research Questions

**Effectiveness of Program and Scalability**: Our research questions explore student success and the efficacy and scalability of the model. We explore student outcomes including course completion, course performance, AP® exam performance, a standard content (FMCE) measure, a standard attitudinal (EBAPS) measure, survey responses, longitudinal college acceptance, STEM course performance and retention. We additionally explore the structure of the blended model and university to school partnership in terms of whether it can be replicated at other sites around the country.

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## V. Pilot Project – Year 1

**OUTCOMES**

**Student Performance**: The data is encouraging and indicate **Project Accelerate participants outperformed their aggregate peer groups from Boston and Massachusetts** who are enrolled in traditional AP Physics 1 classes (see Table 1). 100% of Project Accelerate completers took the AP Physics 1 exam. The average pre/posttest paired fractional gain on the Force Motion Concept Evaluation (FMCE) was .53.

**Retention:** Twenty-one of the initial 24 students completed the course resulting in an 88% retention rate.

**Interest in STEM:** Eight of our 14 BPS completers applied to summer STEM programs. Of these 8, seventy-five percent indicated in our post-course survey that Project Accelerate was "very important" or "somewhat important" in their decision to apply to a summer STEM program. Fifty-two percent of all participants indicated they were either "much more likely" or "somewhat more likely" to pursue a STEM program in college, and the remaining 48% of students indicated "no impact on their decision."

**Demographics:** BU partnered with 4 Boston public high schools (BPS) and 2 suburban high schools. A total of 24 students, 17 BPS and 7 others, enrolled in this pilot project. The demographics for our first cohort were 67% black and Hispanic and 75% on free and/or reduced lunch programs.

## VI. Pilot Project - Year 2

**Increased Numbers and a Pilot Replication Site:** We have 10 partner high schools: 5 BPS, 4 other MA and 1 WV school. There are 25 students enrolled from BPS, 22 from other MA districts and 5 from WV. The physics department at West Virginia University serving 1 high school is partnering with us as our first demonstration replication site.