The Boston Science Partnership: A New Vision of Urban Education

**DEFINITION OF AND CONDITIONS FOR STUDENT SUCCESS**

The BSP is guided by a set of assumptions (or theories) of change:

1. Providing high-quality professional development experiences to BPS science teachers to raise their quality and qualifications will have a positive impact on student learning outcomes.
2. Contextualizing the PD provided to teachers will help ensure transfer to classrooms.
3. Maintaining and building BPS teacher leadership will expand capacity and resources for current and future BPS science education efforts.
4. Expanding direct supports for AP students and teachers, a greater awareness of the AP program, and better student preparation before reaching AP courses will increase access to and success with this level of academic work.

A tiered set of project activities will produce synergies that add benefits beyond those provided by each activity alone.

**...ABOUT WHAT TEACHERS NEED...**

- Content knowledge
- IT pedagogy
- AP and AP Pipeline support
- Climate for conversations about science teaching
- Opportunities for group

**...AND ABOUT WHAT DISTRICT NEEDS**

- Capacity building
- Teacher leaders
- Fidelity to district-wide curriculum
- Science leadership

By demonstrating higher achievement and demonstrating increased interest in science.

**ROLEs OF PROJECT PARTNERS**

- Teams of 8-12 teachers and higher education STEM faculty examined AP tests to increase rigor.
  - CH – provided facilitators and framework
  - BPS – teachers participated and links made to K-12 curriculum
  - UMB, NEU, RCC – Faculty participated

**Sustainability**

- Year-round, comprehensive program for students with teachers.
- UMB, NEU and HMS – hosted summer and afterschool lab times for 300 students
- UMB – hosted practice exam for 50 students
- CB – provided practice exams and urban-focused APS
- BPS – supported training of teachers, committed to sustainability, provided teacher-leaders

**Contextualized Content Course (CCC)**

- Professional learning communities of building-based teachers who engage in a sustained lesson study.
- BPS – Designed CCC, recruited and trained teacher-leaders, supported groups running in schools.
- CCC forms the base of the Noap-funded teacher fellowships and the Phase II: BEST

**AP Science Support Program (Part of SUP)**

- Pipeline Study (University of Massachusetts Boston)
- Contextualized ACC, Recruiter from BPS
- Coaches and Collaborative Coaching and Learning in Science (CCLS)
- Science leadership

**ADVANCED SCIENCE TO STUDENTS TO SUCCEED...**

- Passing scores on standardized tests
- Pathways and access to, enrollment in and success with advanced course work
- Engaged mode of learning
- Teachers who bring deep-content knowledge and effective teaching strategies
- Perception of self as college-bound science student

**IN ORDER TO SURVEY...**

- Students taking AP exams
- Students who apply, accepted and matriculated to STEM majors

**CHALLENGES AND QUESTIONS**

Making the Most of BSP Data and Experience

The BSP has been able to show significant gains in student achievement based on the participation by teachers in the professional development offered. However, with a plethora of data, there are many more investigations that would yield important findings. A few of these include:

- Understand the difference in student and teacher outcomes between professional development centered on content (e.g. chemistry) versus concept-driven topics such as Energy. (See BSP Phase II)
- Follow students for additional years to track the long-term impacts of professional development on student outcomes
- Follow teachers longitudinally to see how their work evolve as BSP integrations mature
- Determine attribution of impacts among the BSP work, overlapping Urban Systemic Project work and other large-scale projects with Boston teachers.

**PERSISTENT ACHIEVEMENT GAPS**

While subgroups increased the percentages passing state exams, not all subgroups increased at the same rates. Challenges remain in regards to achievement gaps among race groups and other subgroups in the districts, most notably Hispanic/Latino, African American, and Special Education students.

Progress can be seen in the enrollment into AP science courses, suggesting that greater progress can be made.

**AP Science Students, by Race**

<table>
<thead>
<tr>
<th>Race</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>14%</td>
</tr>
<tr>
<td>Black</td>
<td>16%</td>
</tr>
<tr>
<td>White</td>
<td>67%</td>
</tr>
<tr>
<td>Multi-racial</td>
<td>15%</td>
</tr>
<tr>
<td>Asian</td>
<td>7%</td>
</tr>
</tbody>
</table>

**Research Questions**

- What roles do the BSP strategies play in the development of highly qualified teachers?
- What is the nature and extent of out-of-field science teaching?
- What roles do the LSAS Strategy play in the development of high-quality instruction?
- Do highly qualified teachers deliver high-quality instruction?
- Do teachers who are not highly qualified deliver high quality instruction?

**Evaluation Questions**

- Has the BSP achieved its project goals? How? What has been the influence of each of the primary strategies on achieving those goals?
- What is the design, implementation, quality and contribution of each strategy? What are the benefits, issues, lessons learned, sustainability factors and impacts?

**STEM Pipeline Study (University of Massachusetts Boston)**

This research sought to investigate how teacher quality, organized STEM pathway support programs, students’ study habits, and their course choices explain retention of students, as well as reasons they leave, along the STEM pathway from high school through graduation from university with and without passage through community colleges.

**Science Teachers Content Knowledge and Retention Study (University of Massachusetts Boston)**

This research examined how teaching science affects the understanding and retention of associated content knowledge learned by teachers during professional development.