Supporting AP Science in Urban Schools

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Agenda

- Introductions
- Why expand AP science in urban schools?
- AP science in Boston: context and goals
- Supporting AP science expansion and improvement
- Analysis of impact
- Looking to the future

College Success

A high school curriculum of high academic intensity and quality such as that found in AP courses is the factor that most contributes to a student's likelihood of completing a college degree.

Exposure to this curriculum is a much better predictor of college success than a student's high school GPA or test scores.

85% of AP students continue their education beyond high school.

Source: Adelman, Clifford. *Answers in the Tool Box.* U.S. Department of Education (1999).

College Completion

Impact of AP on 5-Year College Graduation Rates

Student Group	AP Exam Grade of 3, 4, 5	AP Exam Grade of 1, 2	Took AP course, but not exam
African-American	28% higher	22% higher	16% higher
Hispanic	28% higher	12% higher	10% higher
White	33% higher	22% higher	20% higher
Low-Income	26% higher	17% higher	12% higher
Not Low-Income	34% higher	23% higher	19% higher

Source: Chrys Dougherty, Lynn Mellor, and Shuling Jian, *The Relationship Between Advanced Placement and College Graduation* (National Center for Educational Accountability, 2005)

Strengthening the STEM Pipeline

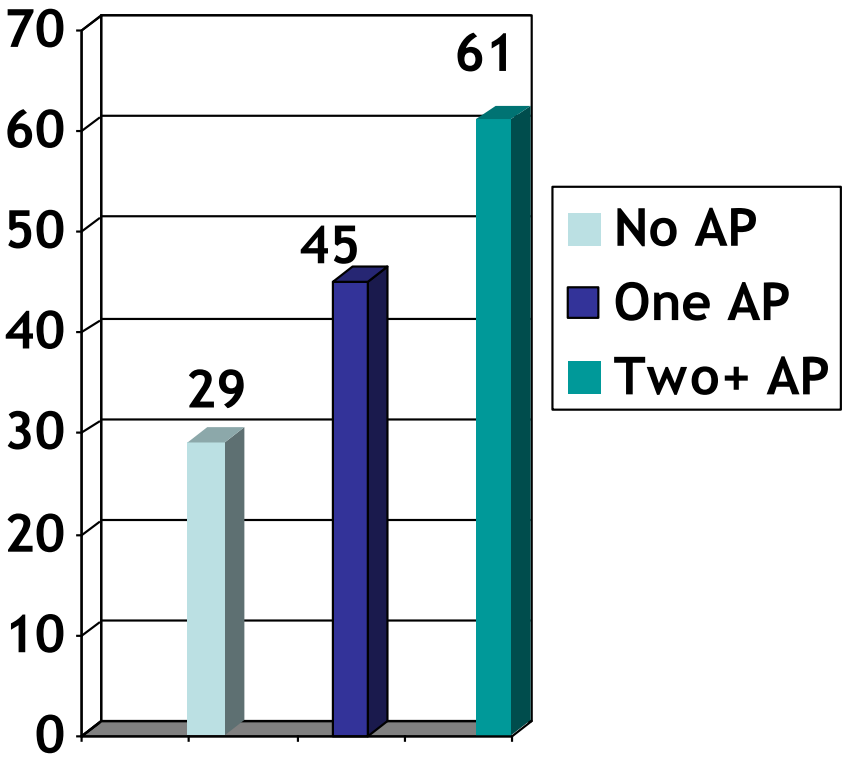
Research shows that students who take an AP Biology or AP Physics science course in high school are more likely to major or minor in those disciplines in college than those students who are first exposed to college level work in math and science in college

Source: "AP Students in College: An Investigation of their Course-Taking Patterns and College Majors", Morgan and Maneckshana, 2002

Research indicates that completion of an AP science course in high school has a significant positive impact on college persistence (attending a second-year of college).

Source: "The Link Between Advanced Placement and College Success". Klofstein, 2005

College Completion



Students who take AP courses and exams are much more likely than their peers to complete a bachelor's degree in four years or less.

Source: Camara, Wayne. (2003). College Persistence, Graduation, and Remediation. *College Board Research Notes (RN-19).* New York, NY: College Board.

Overview of BPS

- A large, diverse student body
  - 56,200 total enrollment K-12; 18,900 9-12
  - 41% black, 35% Hispanic, 14% white, 9% Asian
- Many poor students
  - 71% of students eligible for free or reduced lunch
- 34 high schools, including 3 exam schools

The Driving Forces

- Expanding and improving existing AP science offerings is expensive
- College Board grant programs
- Boston Science Partnership (BSP)
  - $12.5M NSF MSP grant, 2004-09
  - UMass Boston, Northeastern, and BPS
  - Central goal is raising student achievement in science for all students in Boston, Gr. 6 through university level.
  - College Board is a supporting partner
- Other funding sources – MGH, Edvestors


WASTEWATER ALERT!


Middle School
High School
AP College

Our Initiatives

Supporting Students Directly

- Laboratory programs
- Practice exam
- Bridge to AP summer programs
- Graduate students in AP classrooms

Laboratory programs

- Students complete AP lab experiments at universities, as well as some problem solving
- Once monthly sessions (~7 per year) after school or on Saturdays
- Programs led by experienced AP teachers
- Began in 2005-06 and has grown to over 150 students in 07-08
- Many teachers also attend

AP Practice Exam

- AP science students in BPS take a full-length practice exam at UMass Boston
- Tests are graded using College Board rubrics and returned quickly
- First held in 2006 with 135 students and 14 teachers
- 2007 saw an increase to 202 students and 17 teachers
- 2008 registration now taking place
- Teachers reported that this event was extremely helpful in preparing students for the actual exams 2 weeks later

Bridge to AP

- Two-week summer program for students entering AP Science the following year
- Academic and laboratory components
- Began in 2006 with 100 students from 5 schools
- Has grown significantly, this summer about 200 students will attend from at least 8 schools
- A variety of formats in university and hospital settings

Graduate students

- AP science teachers matched with a graduate student in the same science field
- Each graduate student works in their teacher's classroom five hours per week
- Grad students support instruction by tutoring students, setting up and helping to run labs, and helping in any way the teacher wishes
- Program serves ~10 teachers per year, many are new AP teachers

Our Initiatives

Supporting Teachers and Other Stakeholders

- New AP courses
- AP Summer Institutes
- AP callbacks
- AP teacher leader consultant training
- Vertical Teaming
- One-day AP workshops

Adding new AP courses

- Several schools in BPS offering AP Science courses that have not been offered before
- All new programs in non-exam schools; 13 now have at least one AP science
- New courses are in Biology, Chemistry, and Physics B
- New programs supported with textbooks, test prep books, and lab kits

AP Summer Institutes

- Week-long intensive professional development institutes for teachers
- Topics include curriculum, pacing, teaching strategies, textbooks & materials, labs, and AP exam
- Substantial attention to science content
- Unique focus on urban issues
- First held in 2006 in AP Biology and Chemistry with 20 participants, 18 (90%) from BPS;
  - in 2007, offered in all 4 science disciplines; total enrollment was 79, with 29 (37%) from BPS
  - 2008 offerings in Biology and Physics

AP callbacks

- Program for current and potential BPS AP Biology teachers, and graduate students
- Monthly after-school meetings
- Components include teacher sharing, best practices, science content, and pedagogical strategies tailored to urban students
- Run in collaboration with Harvard Medical School

AP consultant training

Professional Development for Teachers

- Currently very few College Board-endorsed AP science consultants w/urban teaching experience
- We plan to train one experienced Boston AP teacher in each science subject
- These BPS consultants can mentor other BPS teachers and lead professional development for a wider audience of urban educators
- We have encountered several obstacles, but one consultant is trained and one is in the process

One-day AP workshops

Professional Development for Teachers

- AP Biology, Chemistry, Physics B
- Standard College Board curriculum for one-day professional development
- Unique focus on urban issues
- Two Saturdays during 05-06 school year
  - 28 teachers attended one or both
  - 16 (57%) from BPS; others from urban schools around New England and beyond
- Did not repeat these in subsequent years, instead focused on other PD

Vertical Teaming

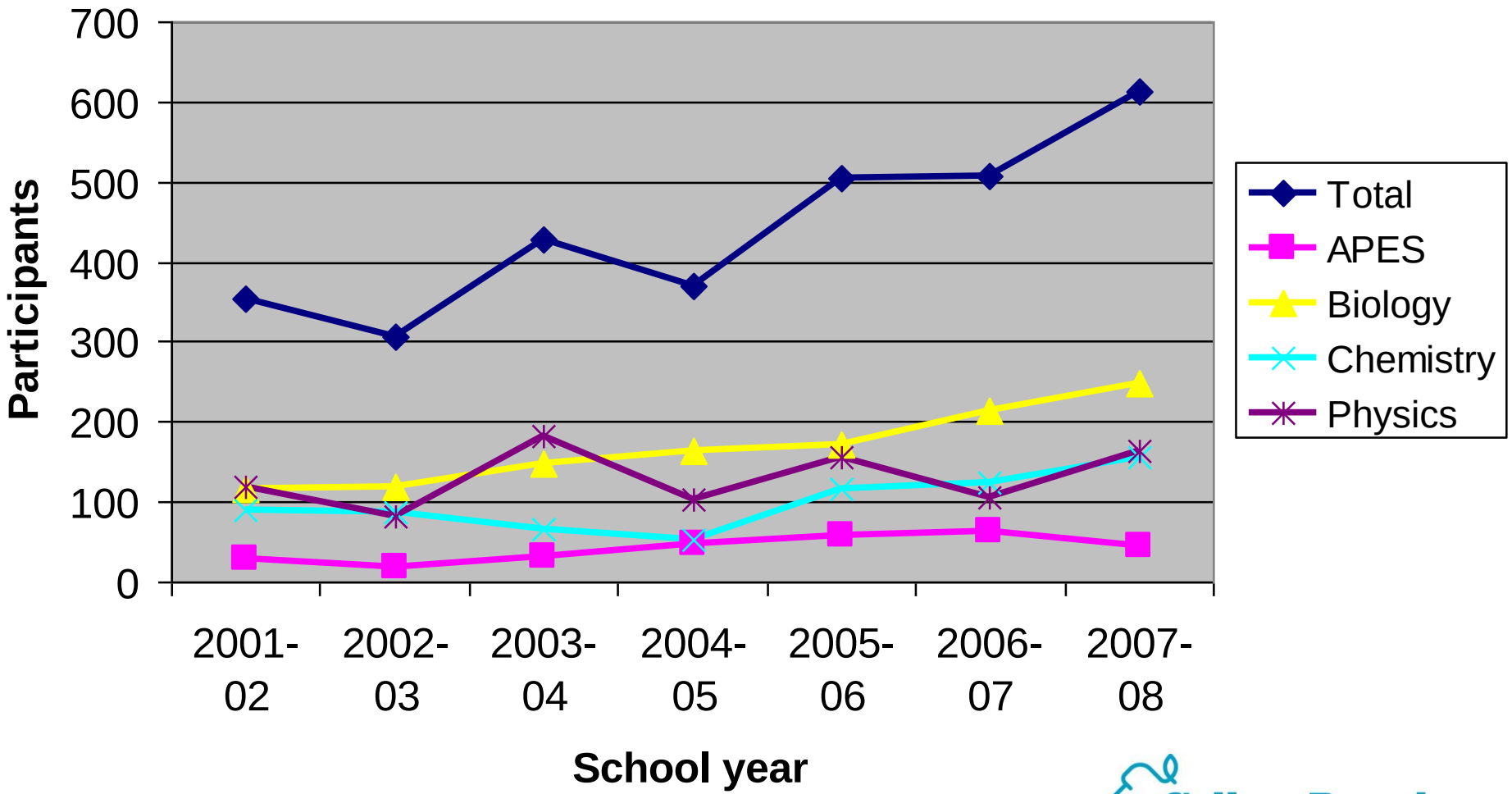
- Diverse groups of science educators work together to link science curricula at different levels
- Focus on skills and knowledge needed to answer AP-level science questions
- First two years involved district-wide participation at one- or two-day events for over 100 educators at levels from middle school to college
- The 2007-08 program is a five-day sequence of vertical teaming activities for a cohort of 40 science educators

BPS AP Science

Then and Now

- Enrollment and course offerings are increasing each year in the district as whole.
  - Gains are greatest in non-exam schools.
- Racial disparities in AP science enrollment are decreasing.
  - However, it is still not representative of district demographics.
- Over the same time period, average scores and passing rates in all subjects are rising.

BPS AP Science Students by Subject



AP Science Participation by Race

Race	01-02 AP Science Students	05-06 AP Science Students	BPS Student Population
Black	22%	27%	41%
Hispanic	8%	14%	35%
Asian	47%	40%	9%
White	23%	19%	14%

Students Passing AP Exams

	Biology	Chemistry	Physics
2005	42 (27%)	11 (21%)	50 (41%)
2006	63 (35%)	62 (49%)	78 (53%)
2007	77 (36%)	53 (42%)	117 (57%)

Recent Highlights

- Between 2000 and 2007, the number of BPS students taking AP science exams has more than tripled from 183 to 517. Enrollment is up again in 07-08 to 609.
- From 2005 to 2007 average scores have increased markedly in all disciplines.
- More than three-quarters of all BPS teachers teaching AP science courses in 2006-07 participated in the BSP's supporting programs in some capacity.
- This year student support programs are serving approximately one-half of the 608 BPS students enrolled in AP science courses

Goals for the future

- At least one AP science course in every school
- Opportunities for all district students to take any of the four AP sciences
- District-wide scores and pass rates continue to improve and eventually meet or exceed national averages
- AP student participation and exam score demographics reflect those of the district
- Find funding sources to ensure support program continuity

Focus Questions

- How can we best meet our goals of providing open access to AP courses while maintaining academic rigor and increasing AP exam scores?
- Which support programs provide the best return on the required investment of funds and manpower?
- How can AP support programs be sustained over the long term?

An example from one school

- Had pre-existing AP Biology, Chemistry, and Physics courses
  - Very low AP exam scores across the board
- AP teachers and students have been heavily involved in support programs
  - PD for teachers, grad students in classrooms, Bridge to AP, lab programs, practice exam
- AP scores have risen dramatically
- The school is making plans to expand AP science to include more students and teachers.

An example from one school

	Biology		Chemistry		Physics B	
	04-05	06-07	04-05	06-07	04-05	06-07
students	15	13	15	18	26	30
% 1 scores	87	38	87	22	81	33
Avg. score	1.13	1.92	1.33	2.33	1.27	2.30

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