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AP® Professional Development in Florida: Effects on AP Exam Participation

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Introduction

Continuing professional development is an important activity for most teachers in the K–12 system, and it is even required of some teachers in order to maintain certification (Maldonado, 2002). Professional development programs are predicated on the assumption that the teachers who receive the training will in turn positively affect student outcomes. When investigating the efficacy of any professional development program, it is important to consider both the program's duration (one-shot versus multiple sessions) as well as its characteristics (content-specific material, inquiry-based learning, collaborative grouping, or established learning communities) (Kennedy, 1998; Maldonado, 2002).

An integral part of any professional development program is an evaluation of the program's effectiveness. The importance of this evaluation component is grounded in the need to understand if the program is meeting its stated objectives and to make recommendations for subsequent improvements. However, the relationship between teacher professional development and student outcomes has not been firmly established in the literature. There are only a few studies that make the direct link between professional development and student outcomes, and these are generally linked to specific initiatives (Banks, Fickel, and Moon, 2004; Kennedy, 1998). Historically, most evaluations of professional development courses rely on participant self-reported ratings of the course's quality or usefulness, which are collected upon completion of the program. Much less is known about how and to what degree the information is actually being used in the classroom. Other studies have also relied upon more easily obtainable indices of teacher preparation or quality such as licensure status, years of experience, and match between program of study and the course content actually taught.

Although preliminary, some encouraging work has explored the link between professional development participation and student outcomes in the College Board's Advanced Placement Program® (AP®). In a study that investigated the effects of AP Vertical Teams® training (College Board, 2002), some modest effects with regard to increased minority participation in AP Exams were reported. The modest nature of these results was attributed partially to varying levels of Vertical Team implementation. However, the study also highlights the importance of a continuing program of training marked by follow-up activity and teacher acculturation to the program. In a more recent study conducted in Florida and summarized below, a connection is made between teacher participation in AP professional development and levels of student participation in AP Examinations.

AP Professional Development

The primary goals of the AP professional development program are listed on the AP Central® Web site as including:

> …expanding professional development opportunities such as our workshops and Summer Institutes, providing teaching resources for AP courses, addressing equity by building partnerships with universities and other organizations, and advancing the field by continually learning more effective ways to support the AP community. (College Board, 2006, Professional Development section, para. 2)

In particular, the two types of AP professional development opportunities available in Florida in the relevant time period were AP Summer Institutes and AP half-day workshops.

AP Summer Institutes are four- or five-day course-specific workshops offered through colleges and universities and are usually led by college professors and/or AP teachers who have substantial experience in the discipline. The topics that these opportunities cover include:

- AP courses: goals, objectives, content, resources, bibliographies, and equipment
- The AP Examination: how it is developed and graded
- Syllabi, lesson plans, and assignments
- How to refresh and improve existing AP courses
- Recent changes in AP Course Descriptions
- Strategies for teaching students in the Pre-AP® years (*Endorsed AP Summer Institutes,* 2006, p. 2)

These events are most commonly attended by teachers new to the AP Program and focus primarily on providing content- and course-specific materials, as well as teaching strategies.

Half-day workshops, on the other hand, tend to serve both new and more experienced AP teachers by providing information on updates to AP Course Descriptions and changes to AP Exams. Participants receive additional materials including "…course outlines; content-related handouts; and student samples, scoring guidelines and commentary for the most recent AP Exam free-response questions" (*K–12 Professional Development Catalog,* 2006, p. 1). These workshops are typically four hours in length and have more emphasis on changes to and preparation for the AP Exam than they do on course content.

Data

The sources of data for this study include:

- College Board data on AP professional development (1999–2004)
- College Board data on AP Exam–taking patterns (2002 and 2004)
- Florida Department of Education (FL DOE) student-course data (2001-02 and 2003-04)
- FL DOE teacher-course and demographic data (2001-02 and 2003-04)
- Market Data Retrieval (MDR) site capacity and school demographic data (2005)

Given the many different sources of data and the complexity of individual-level data matching, this study performs analyses at the school level. It is clear that important variations exist at the student and teacher levels—in addition to the school level—and future studies would benefit from evaluating those effects in more detail. This study began with AP Exam–taking data for 333 and 351 Florida public schools for the 2002 and 2004 exam years, respectively. Data on AP professional development for the two years prior to the 2001-02 and 2003-04 school years were available for 309 and 343 Florida public schools. All of these schools have associated with them the Florida Department of Education student and teacher data and the Market Data Retrieval school- and district-level data. After matching these various data sources the final samples include 317 and 327 Florida public schools for the 2001-02 and 2003-04 school years. The record of AP professional development has been limited to the two years prior to the beginning of the relevant school year because in that time period the teacher population appears to have been relatively stable. These data are summarized in Table 1.

Table 1

Summary Statistics—2001-02 Cohort
Sample Size: 317 Florida Public Schools

	Minimum	*Maximum*	*Mean*
Indicator of 0.0%–15.9% of the School Population at or Below the Poverty Level (2005)	0	1	0.46
Indicator of 16.0% or More of the School Population at or Below the Poverty Level (2005)	0	1	0.54
Total Student Enrollment (2001-02)	96	5,423	1,988.09
Number of AP Teachers (2001-02)	1	34	9.63
Days of AP Summer Institute PD in the Three Years Prior to the 2001-02 Academic Year	0.0	94.5	8.99
Days of AP Workshop PD in the Three Years Prior to the 2001-02 Academic Year	0.0	31.5	3.97
Number of AP Exams Administered (2002)	0	2,107	273.46

Summary Statistics—2003-04 Cohort
Sample Size: 327 Florida Public Schools

	Minimum	*Maximum*	*Mean*
Indicator of 0.0%–15.9% of the School Population at or Below the Poverty Level (2005)	0	1	0.45
Indicator of 16.0% or More of the School Population at or Below the Poverty Level (2005)	0	1	0.55
Total Student Enrollment (2003-04)	70	4,979	1,982.24
Number of AP Teachers (2003-04)	1	37	10.48
Days of AP Summer Institute PD in the Three Years Prior to the 2003-04 Academic Year	0.0	220.5	31.13
Days of AP Workshop PD in the Three Years Prior to the 2003-04 Academic Year	0.0	41.5	7.07
Number of AP Exams Administered (2004)	0	2,116	349.81

Methodology

The following models attempt to control for the following potentially confounding factors: (1) socioeconomic level of the school district; (2) school size; and (3) AP program size. The districtwide poverty-level data will serve as indicators of each school's socioeconomic status, and the Florida DOE data on student enrollment and the number of AP teachers will control for school size and AP program size, respectively. Beyond these three factors, one expects that the stronger a school's participation in AP professional development, the greater the effect on overall exam taking at that school.

Upon further examination, it seems that within the two samples in question, AP Exam taking does not vary significantly with poverty level, average household income, or per-pupil expenditure. Given that Florida has made state funds available for AP Exam fees, the disincentive normally presented by the burden of those fees is removed. This policy has likely helped decrease the correlation between these socioeconomic controls, so much so that they have been excluded from the following ordinary least-squares regression models shown in Table 2.

Results

The model fit for both the 2001-02 and 2003-04 regression cohorts is quite strong with R-square values of 0.7232 and 0.7753, respectively. The AP teacher count parameter is positive and significant at the 0.01 level, indicating that for each additional AP teacher a school employs, the school administers approximately 40 and 50 additional AP Exams for the 2001-02 and 2003-04 cohorts, respectively. This parameter accounts for by far the most variance for either cohort, with partial R-square values of 0.6937 and 0.7718 for the 2001-02 and 2003-04 cohorts, respectively.

The total student enrollment parameter is significant at the 0.10 level and very slightly negative in the 2001-02 cohort and is not significant at the 0.10 level in the 2003-04 cohort. Regardless of the significance level, the effect size is so close to zero that the effect of school size after controlling for the number of AP teachers is effectively zero. With that being said, the slightly negative effect of enrollment could reflect the difference between those schools that have many AP teachers because the school has prioritized its AP program and those schools that have many AP teachers because the school is large. Having a large school in and of itself may be a less powerful predictor than having a school climate that supports academic rigor through advanced courses.

Table 2

Regression Output—2001-02 Cohort
Dependent Variable: Total AP Exams
R-Square: 0.7232

Variable	*Parameter Estimate*	*Standard Error*	t *Value*	p *Value*
Intercept	-112.36 ***	21.66	-5.19	< 0.0001
Number of AP Teachers (2001-02)	43.46 ***	2.13	20.43	< 0.0001
Total Student Enrollment (2001-02)	-0.02**	0.01	-1.97	0.0499
Days of AP Summer Institute PD in the Three Years Prior to the 2001-02 Academic Year	-1.77**	0.80	-2.21	0.0278
Days of AP Workshop PD in the Three Years Prior to the 2001-02 Academic Year	7.30 ***	2.16	3.38	0.0008

Regression Output—2003-04 Cohort
Dependent Variable: Total AP Exams
R-Square: 0.7753

Variable	*Parameter Estimate*	*Standard Error*	t *Value*	p *Value*
Intercept	-154.62 ***	23.75	-6.51	< 0.0001
Number of AP Teachers (2003-04)	51.87 ***	2.11	24.56	< 0.0001
Total Student Enrollment (2003-04)	-0.03*	0.01	-1.81	0.0719
Days of AP Summer Institute PD in the Three Years Prior to the 2003-04 Academic Year	-0.29	0.45	-0.65	0.5152
Days of AP Workshop PD in the Three Years Prior to the 2003-04 Academic Year	2.95*	1.76	1.67	0.0953

***: Significant at the 0.01 level.
**: Significant at the 0.05 level.
*: Significant at the 0.10 level.

The models in Table 2 assume that the number of days spent at an AP Summer Institute and the number spent at half-day AP professional development workshops have significantly different effects on AP Exam taking. The data confirm the earlier supposition that different program durations affect outcomes differently for both cohorts of data, though the results across cohorts do seem to diverge in the size and significance of the marginal effects.

The effect of AP Summer Institutes appears to be significant at the 0.05 level and negative in 2001-02, and it does not appear to be significant at the 0.10 level in 2003-04. This is at odds with what one would expect, but there may be factors outside the scope of these analyses that explain this outcome. Examples of such potential factors are included in the discussion section.

Half-day AP professional development workshops also seem to have slightly different effects on the two cohorts, with the 2001-02 parameter being significant at

the 0.01 level and positive and the 2003-04 parameter being positive and only significant at the 0.10 level. The effect size across the two cohorts ranges from adding an additional seven exams for every day spent in half-day AP professional development workshops for the 2001-02 cohort to only an additional three exams for each day for the 2003-04 cohort. One must keep in mind that the parameter associated with the 2003-04 cohort is not significant at the traditional 0.05 confidence level, and such a difference in significance levels may indicate some unidentified sources of variation across the two cohorts.

Discussion

The limitations of the data and design used in this study—foremost of which are the facts that the data are aggregated to the school level and that they are limited to Florida public schools—do not allow us to make causal inferences. This study should, however, fuel future discussion and careful analysis of professional development programs and the direct effects that they have on student outcomes. In particular, studies utilizing multilevel modeling that are able to link students directly with teachers could separately capture classroom-, teacher-, and school-level variation would circumvent many difficulties encountered in this study.

Difficulties aside, when considering counter-intuitive sign and significance level of the AP Summer Institute parameter, one must recall that the main population attending AP Summer Institutes are teachers who are new to teaching AP and, for that reason, students may not feel sufficiently confident in their abilities and may not choose to take the AP Exam. This parameter may therefore be inadvertently tapping variance attributable to AP teacher inexperience. However, including average AP teacher tenure into the model does not add to the explanatory power of the model or counteract the proposed inadvertent proxy of teacher inexperience. Perhaps if the Florida DOE data tracked not only how long the teacher had been employed at that particular school, but also the total length of his or her career or total tenure as an AP teacher, such a model would yield more precise results.

Another possible and related explanation may be that evaluating the effect of teacher professional development on AP Exam taking at the school level may confound any teacher- or classroom-level effects. Yet another possible explanation is that there is a longer lag between the time a teacher can incorporate what he or she has learned in an AP Summer Institute than between the time a teacher can incorporate what he or she has learned in a half-day workshop. Finally, given that such a large portion of the variance in AP Exam taking is accounted for by the number of AP teachers a school has, the varying significance levels may simply be a statistical artifact.

The fact that half-day workshops seem to be associated with a more direct and positive effect on exam-taking patterns within a school seems to make sense, because the content of the workshop tends to focus on changes to the AP Exam and exam strategies and readiness. These are more targeted workshops from which new and experienced AP teachers alike can directly and immediately benefit, whereas it may take a longer time for AP teachers to incorporate what they learned in an AP Summer Institute into their teaching practices and exam-preparation strategies.

These outcomes are consistent with expectations that targeted, one-shot, exam-specific workshops are associated with greater increases in exam taking and lend themselves to immediate implementation more than the broader, multiple-day AP Summer Institutes. Even after controlling for by far the most prominent predictor of AP Exam volumes at a school—namely the number of AP teachers—schools with a record of participation in these professional development activities generally appear to be associated with greater exam volumes than otherwise similar schools.

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