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Policy Appears upon the Scene, Hand in Hand with Poverty: An Analysis of the Moderating Effects of Teacher Attitude on the Relationship Between Professional Development and Student Achievement.

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LOYOLA UNIVERSITY CHICAGO

POLICY APPEARS UPON THE SCENE, HAND IN HAND WITH POVERTY: AN
ANALYSIS OF THE MODERATING EFFECTS OF TEACHER ATTITUDE ON THE
RELATIONSHIP BETWEEN PROFESSIONAL DEVELOPMENT AND STUDENT
ACHIEVEMENT.

A THESIS SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
MASTER OF ARTS
PROGRAM IN APPLIED SOCIAL PSYCHOLOGY

BY
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CHICAGO, IL

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ABSTRACT

Massive deficits in local, state and national education budgets are forcing schools to adapt their spending to align with these reductions. Rather than merely increasing or decreasing resources, the effectiveness of resource allocation is demanding renewed attention at all levels of educational expenditure. The purpose of this study is to assess the effectiveness of teacher professional development across five campuses at Chicago International Charter School. It is the goal of this project to examine how teacher professional development directly impacts student performance, as well as to evaluate whether this relationship is moderated by teacher attitude towards professional development activities. It was determined that students of teachers who receive professional development within the subject of vocabulary did not exhibit a significantly higher mean growth in vocabulary scores than students of teachers who did not participate in the initiative. However, this relationship was found to be moderated by teacher attitude, in that students of teachers who participated in the professional development, and possessed a positive attitude towards the professional development activities, did yield growth scores above and beyond students of teachers who attended professional development activities and possessed a negative attitude, as well as students of teachers who did not participate in the professional development activity. The results of this study serve not only to benefit CICS and its affiliates, but also aim to

quantitatively highlight some of the variables that drive classroom instruction and student achievement

Introduction

A pattern of annual increases in elementary and secondary school enrollment beginning in the early 1980's propelled national attention towards education (National Center for Education Statistics, 2009). The year 1980 saw the Department of Education rise to a federal position in the U.S. cabinet. Shortly after, in 1981, the United States Secretary of Education, Terrel H. Bell, announced that "...something is seriously remiss in our educational system" (NCEE, 1983, p.6). He subsequently appointed the bipartisan National Commission on Excellence in Education (NCEE) to assess the quality of teaching and learning in U.S. schools. After funding more than 40 studies, analyzing the most current data, and conferring with administrators, educational experts, teachers, and students, the NCEE produced a report in 1983 entitled, *A Nation at Risk* that presented the following conclusion:

If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves... We have, in effect, been committing an act of unthinking, unilateral, educational disarmament. (p.10)

Unfortunately, since this assertion was made, the situation has not improved. Despite an estimated \$661 billion spent in education during 2009, the U.S. educational system is still in desperate need of improvement (NCES, 2009).

Debates about how to improve public education in America often focus on whether the government should simply spend more on education. Federal and state

policymakers proposing new education programs often base their arguments on the need to provide more resources to schools that will improve opportunities for students. Their voting constituents do not disagree with this argument. Polling data show that many people believe the government allocates insufficient resources to schools. A poll conducted annually from 2004 through 2007 (Lowell & Gallup, 2007) found that American adults list insufficient funding and resources as a top problem facing public schools in their communities.

However, simply increasing government spending on education may no longer be a viable option for policymakers. Twenty-nine states and the District of Columbia faced budget shortfalls totaling approximately \$48 billion for the 2008-2009 school year (McNichol & Lav, 2008). As long-term budgets continue to face increasing challenges, even more states could experience budget shortfalls in education in future school years.

According to the recent governor's report (ISBE, 2010), Illinois governor, Pat Quinn, announced education in the state of Illinois would face a budget deficit of \$1.3 billion dollars for the 2010-2011 school year. Illinois wasn't the only state facing crippling cutbacks that require extreme counterbalancing measures. Ohio is closed 10% of its schools statewide. Michigan proposed nearly 10,000 teacher layoffs to quell the financial burden. The state of Hawaii has issued the proposal of Friday "shutdown days," wherein districts would adopt four-day school weeks. Several others are proposing to combat these ongoing deficits by shortening the calendar year, increasing class sizes, eliminating many sporting programs, and encouraging faculty and administrative pay cuts or freezes.

Although similar budget problems are not new to the city of Chicago, the solutions must be. The Chicago Public Schools District (CPS) faced a \$475 million deficit for the 2009-2010 year. With efficiency improvements, which included the elimination of over 500 personnel and ineffective programming, as well as one-time revenue opportunities, CPS closed this budgetary gap. However, these one-time opportunities are no longer an option for upcoming fiscal years. Coupled with the effects of decreased state funding and local revenue, a \$600 million deficit was created for the 2010-2011 school year (CPS, 2010).

Before allowing these effects to permeate the schools themselves, Chicago Public Schools planned again for major cuts to the Central Office and Citywide Services. Over the course of the year, these would include layoffs of over 500 more personnel and additional programming, sparing only \$200 million dollars. Unfortunately, the schools and students themselves could not altogether escape the impact. According to a Chicago Public Schools (CPS) briefing (April, 2010), budget shortfalls would cause potentially damaging effects, such as an average increase in classroom size from 27 students per room to 35 students.

In addition, Chicago Public Schools saw an operating expenditure per-pupil percentage decrease for the 2010-2011 school year. The operating expenditure per pupil is the gross operating cost of a school district divided by the nine-month average daily attendance for the regular school term. At traditional schools, the number of students projected to enroll in the fall determines the number and support staff each school receives based on established formulas (Office of Performance, 2010). In simpler terms,

enrollment translates into staff positions, which translates into salaries and benefits, which translate into operating budgets.

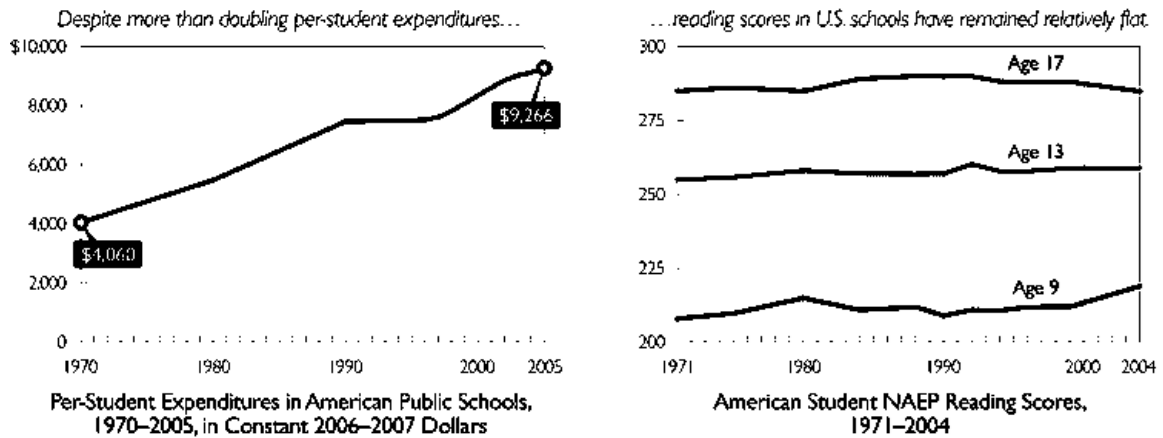
Nontraditional schools, such as charter schools, also receive funds based on their enrollment, but they receive a specified amount per student. This amount pays for all of their operating expenses, including salaries and benefits. Funding is not tied to positions, which gives schools of this nature more flexibility in deciding how to spend their budget dollars. Charter schools specifically, were estimated to face a per-pupil decrease of nearly 12% in the 2010-2011 school year. This translated to approximately \$5,381 per-pupil revenue for elementary students and \$6726 in per-pupil revenue for high school students. To put this in perspective, the average traditional public school in the United States received \$10,615 per pupil in the year 2006 (NCES, 2008). These data alone increase the need to examine how school funding may be related to student performance.

Furthermore, research shows that simply increasing spending is not the sole answer to improving education, nor should it be the end-goal. While it is often the contention that any education problem requires increased spending, and, conversely, that reform is impossible without more funding, research indicates this may be erroneous thinking. Studies comparing long-term spending trends with long-term measures of student performance challenge the belief that spending is correlated with student achievement. When assessing per-pupil expenditures in the United States against American student test scores on the National Assessment of Education Progress (NAEP) reading examination from the year 1970 to the year 2004, it was determined that while

spending has more than doubled in the past four decades, reading scores have remained relatively stagnant (see Figure 1).

Figure 1. Per-student expenditures in the United States compared against American Student NAEP reading scores.

The "Link" Between Education Spending and Student Performance



High school cohort graduation rates provide another historical barometer of American educational performance. A cohort graduation rate looks beyond the senior year, and incorporates the enrollment and attrition rates of a group of students beginning freshman year, and ending with graduation. According to the National Center for Education Statistics, the average cohort graduation rate for American public schools has remained relatively stagnant over time. In 1990, the average graduation rate was 73.7 percent. By 2005, the rate had increased modestly to 74.7 percent. However, the 2006 data show that the national cohort graduation rate has dipped to 73.4 percent (National Center for Education Statistics, 2008).

Academic researchers have also sought to answer this question of whether education expenditures are correlated with student performance. However, there is a lack of consistent evidence to effectively answer this question. Over a decade ago, Eric Hanushek (1996) studied the effect of per-pupil expenditures on academic outcomes at the national level, finding either no relationship or a relationship that is either weak or inconsistent. However, researchers Larry V. Hedges and Rob Greenwald analyzed the same data used by Hanushek and concluded that increasing per-pupil expenditures has a significant positive impact on student achievement (Hedges and Greenwald, 1998). A more exhaustive analysis determined that increased funding generated this positive outcome only for certain types of school resources. What they concluded is that increased spending provided access to schooling, not necessarily enhanced outcomes. This claim asserts that common sense tells us that more modern schools need more teachers, materials, and increasingly elaborate facilities. Those all require an increase in funding to thrive, especially as schools integrate special education students, create programs for English-language Learners, and provide computers and other multimedia features for classrooms.

To determine the role funding plays in academic achievement, all political and philosophical camps agree that educators need legitimate indicators that tell them whether the basic design and operation of their schools direct these continually changing resources in ways that sustain and enhance the district's academic strategies and priorities. One such method for attaining this insight is through academic outcomes. Some researchers have attempted to pinpoint particular spending areas that may be

inhibiting student achievement. For example, Henry Levin (2008) emphasizes the waste of classroom time and ineffective professional development as key components to stagnating student achievement. Mike Schmoker (2009) highlights the ineffective instructional practices such as worksheets and movies, and uses his research to encourage educators to replace such tactics with purposeful lessons and curricula. Wasteful spending appears to be a contributing factor to a lack of correlation between funding and achievement, but even this notion is difficult to understand and communicate (Grubb & Tredway, 2010). Although schools can easily undertake an audit of wasteful spending, eliminating these problem areas may conflict with powerful interest groups, such as teachers' unions. Additionally, these types of program evaluation still lack the real world application component, as they are unable to inform teachers and schools of what they can or should do instead.

Yet another proverbial stalemate surfaces when researchers have attempted to evaluate whether policy investments in increasing teacher quality relate to improvements in student performance. These investments include teacher education, licensing, hiring, teacher preparation and continuing education. State policy surveys and case study data have been used to assess the effectiveness of policies that influence the overall level of teacher qualifications at the state and national levels. Quantitative analyses indicated these state mandated variables boast weak correlations at best with improvement in student performance across core subjects, such as reading and math (Mullens et al, 1996). However, in a more recent study assessing areas of spending against student achievement (Crampton, 2009), investment in human, social, and physical capital accounted for

between 55.8 and 77.2 percent of the variation in student achievement in fourth and eighth grade Reading and Mathematics assessments. For this analysis, human capital was defined as a “stock of knowledge and skill, embodied in an individual as a result of education, training and experience that makes him or her more productive” (p. 309). Investment in human capital was found to be consistently the largest influence on student achievement followed by social and physical capital.

Inconsistency seems to strike again when analyzing spending practices against resources that have been shown to be effective for increasing student improvement. Teacher salaries have shown to improve outcomes, because they allow districts to attract a larger pool of applicants from which to choose. The teacher to pupil ratio also appears to affect student progress through high school. In secondary education, teacher experience enhances performance outcomes, and higher salaries affect teacher persistence. These have all been shown to forge a direct relationship between per pupil spending and student achievement (Grubb, 2010). However, despite drastic increases in educational spending over time, the nature of this spending has not aligned with these research outcomes (See Table 1). Direct expenditure on salaries for instructional staff appears to have grown steadily over time. However, in proportion to other expenditures in schools, direct spending on instructional expenditure has actually decreased from two-thirds of the budget in 1940 to two-fifths in 1990 (Hanushek & Rivkin, 1994).

Despite these results promoting the effectiveness of some types of spending versus those that are deemed wasteful, many types of reform require resources that money simply cannot buy. Aside from identifying and eliminating wasteful spending, a

second tactic is to increase the incentives for schools and districts to spend resources well. Erik Hanushek and Alfred Lindseth (2009) call for clearer standards and accountability. They recommend rewarding performance at every level, from teachers'

Table 1. Public school resources and an analysis of total and instructional expenditure between 1890 and 1990

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Table 2-1. Real Current Expenditure on Public Schools, Selected Years, 1890–1990

<i>Item</i>	<i>1890</i>	<i>1940</i>	<i>1950</i>	<i>1960</i>	<i>1970</i>	<i>1980</i>	<i>1990</i>
Total current expenditure (billions of 1990 dollars)	2.09	19.65	25.79	52.47	107.1	133.5	187.4
Instructional staff expenditure (percent of total)	80.4	67.3	61.2	60.9	57.4	46.0	45.8

Source: Hanushek and Rivkin (1994).

and administrators' pay to state funding formulas. They suggest decentralizing decision making about resources to the school level and adopt school-based budgeting so principals and other on-site personnel have the fiscal resources to develop and implement their own improvement plans. Currently, districts decide most funding allocations, and schools have neither the incentives nor the funds to develop their own resource plans (Grubb & Tredway, 2010). However, school-based budgeting creates the opportunity and the resources for principals and school councils to develop the resources that are effective at their schools, with their own students and their own teachers. In these situations, such as with charter schools for example, school leaders necessarily become more

knowledgeable about "where the money goes" and which resources are enhanced, because they are the ones allocating, developing, and being held accountable for these resource decisions.

Whether the solution is regular waste auditing, increasing incentives, or enhancing school-level involvement in decision making, leading researchers in the area are all beginning to acknowledge that any effect of per-pupil expenditures on academic outcomes depends on how the money is spent, not on how much money is spent. Instead of simply increasing funding, federal and state policymakers should implement education reforms designed to improve resource allocation and boost student performance.

According to Hanushek (1996):

Few people would recommend just dumping extra resources into existing schools. America has followed that program for several decades, with no sign that student performance has improved...The issue is getting productive uses from current and added spending. The existing evidence simply indicates that the typical school system does not use resources well. (pg. 69)

While it is increasingly clear there is so much that needs to be done to improve the quality of education in this country, one of the largest questions facing education today is where should these increasingly limited resources be focused? The U.S. Department of Education, educators, administrators, and educational researchers have argued that the answer to this question is, in large part, teacher professional development (Darling-Hammond, 2000; No Child Left behind, 2002; Rebor, 2004). For the purposes of this research, teacher professional development (PD) is defined as ongoing,

intentional, systemic educational and training opportunities provided to educators in their schools and districts (Guskey, 2000).

Although *A Nation at Risk* marked the evolution in achievement and initiated movement towards standards-based educational assessment, the No Child Left Behind Act (2001) aimed to also profoundly change classroom instruction. The operational processes of No Child Left Behind (NCLB) sought to punctuate the power of assessment in the lives of students, teachers, parents and anyone invested in the school system. Funding was aimed to be tied directly to accountability expectations; if children in schools weren't learning, the new law required that we find out why and correct the problem. NCLB mandated that states build assessment systems that tracked the achievement of all students against a common set of high standards (Jorgensen & Hoffman, 2003). These new regulations are being continually developed, fostering an environment where teachers are being held accountable for results in their classrooms. In exchange for this increase in responsibility, schools are encouraged to use funds for teacher professional development, and ultimately, teacher retention.

However, many current teacher professional development activities are criticized for having little impact on student outcomes (Guskey, 2000). It is theorized that this is partly because they often fail to incorporate key components of effective adult learning such as modeling, observation, and feedback (Rebora, 2004). This raises yet another significant question: What then, makes teacher professional development effective?

Although many professional developments vary in effectiveness based upon design (Garet et al, 2001; Guskey, 2000), these initiatives also depend upon

characteristics of the teachers who take part in them (Newman et al, 2000). Several characteristics have been limited to teachers' attitudes about professional development, leading many educational researchers to believe attitude is the key component to effective professional development (Torff, 2005). Some additional characteristics thought to affect teacher attitude include age, years of teaching experience, gender, grade level (elementary versus secondary), and level of educational assessment (Torff, 2008).

To flesh out exactly how these variables are associated with teacher professional development, Bruce Torff developed a scale to assess the extent to which teachers are amenable to teacher professional development initiatives (Torff, 2005). Through several studies, modification of the original scale, and scrupulous tests of validity, Torff and colleagues (2005; 2008) were able to explore the various ways these variables affect professional development. What they discovered with regard to teaching experience is that in the first two years of teaching, teachers increased their positive attitudes towards professional development, which in turn, increased their overall support for professional development. Controlling for age and grade level, this attitude slowly diminishes as experience increases until the point of ten years, where overall support for professional development tends to stagnate. Within these first ten years, it was revealed teachers at the secondary level tended to have slightly less positive attitudes about professional development than did elementary teachers. For teachers who possessed more than ten years of teaching experience, attitudes tended not to be affected by any of the variables, particularly gender and level of educational attainment.

While research to this point examines how attitude can affect professional development activities, it fails to this point to make the connection on how this positive attitude towards professional development might directly impact students' academic achievement. The study described in this paper seeks to examine this relationship within the challenging fiscal climate of Chicago Public Schools (CPS).

Chicago International Charter School (CICS) is a public charter school housed within Chicago Public Schools, serving over 8200 students across 13 campuses in 2010. Using a data-driven strategy, this college preparatory, open-enrollment school outperforms area schools serving similar populations, and boasts some of the highest academic outcomes in the state.

In an effort to support continuing education for faculty, CICS provides weekly teacher professional development programming for its teachers. One such professional development activity across CICS campuses was conducted and facilitated by Barbara Kurth. On behalf of CICS, she provided a structured and standardized professional development activity dealing with the topic of vocabulary that was administered at ten of the CICS campuses over the course of the 2009-2010 school year. The PD was presented to teachers of grades 3-8 on each campus during the Wednesday early-release program, wherein the additional time is allotted specifically for PD activities. Following the 2-hour instructional session at each campus, Barbara Kurth also did follow-ups, which included classroom observations, evaluations of the implementation and effectiveness of the PD, as well as modeling if requested. Because vocabulary was the focus of the teacher professional development, and teachers were urged to implement the new

information in their respective classrooms, students of teachers who participated in this professional development should see growth in the vocabulary topic strand on academic assessments.

The Northwest Evaluation Association (NWEA) has developed academic assessments based on over thirty years of research that adapt to the child in real time as he or she is taking the test. One such test, the Measures of Academic Progress (MAP) is used by Chicago International Charter School. This test, administered three times per year, adjusts to the student by increasing or decreasing difficulty as the student responds. With this method, the test itself narrows in on the student's learning level, yielding an equal-interval RIT Scale value (Rasch Unit). RIT assigns a value of difficulty to each item, and aims to measure understanding in the topics of Reading, Math, Concepts & Processes, and Science regardless of grade level. The four subjects are divided into sub-topics, or strands, where teachers and administrators are able to access charts that show which topics and sub-topics the student has mastered, and those which he or she may benefit from additional attention. This approach provides data that can be used to individualize instruction and analyze current programming at the student, classroom, grade and school level. MAP is a key tool for measuring student growth, predicting state-assessed proficiency over time, driving classroom instruction, and identifying potential needs for areas of teacher professional development.

This project serves not only to explore the ideological goal behind professional development in that it aims to drive classroom instruction, but seeks also to objectively evaluate the role an individual teacher plays in this scenario. In comparing student RIT

vocabulary growth scores between the Fall and Spring testing intervals, it was predicted that students of teachers who participated in the CICS vocabulary professional development activities will exhibit greater RIT growth in the vocabulary subject strand of the test than those students in classrooms of teachers who did not participate in the professional development. It is also expected that due to the potentially moderating effect of teacher attitude towards professional development, students of teachers who have a positive attitude towards professional development (PD Compliant) will demonstrate academic growth above and beyond students of teachers who hold a negative attitude towards professional development (PD Aversive).

Method

Participants

To assess the relationship between professional development and student growth, teachers and students were chosen from grades 6-8 across the CICS campuses. The intended teacher sample size was 20 (10 who participated in the professional development and 10 who did not). However, of the eligible middle school teachers (those who had access to the professional development activity, and submitted responses to the attitude inventory), only 8 were eligible for the control group. One teacher within this group specializes in serving a small group of students with special needs. As this group of students varies greatly from the overall student population, and maintains a system of academic accountability that differs from the population, this teacher was removed from calculations. Therefore, seven teachers who did not participate in the professional development activity were selected for the control group. Seven teachers in

grades 6-8 who participated in the Vocabulary professional development were randomly selected, matched only by campus with the teachers who did not participate in the professional development activities. The representation of the three grade levels (6-8) was as evenly distributed as possible (five 6th grade teachers were selected; four 7th grade teachers were selected; five 8th grade teachers were selected).

Students of the seven teachers who participated in the vocabulary professional development were identified and placed in one student group (n=144). The second group consisted of students who were in classrooms of the seven teachers not participating in the vocabulary professional development activities (n=148). To determine the difference in mean growth between students of teachers in attendance at the PD activity and the mean growth produced by students of teachers not in attendance, the participation code of each teacher (0 for participation, 1 for non-participation) was assigned to his or her respective students. To examine the effect teacher attitude has upon the relationship between professional development and student growth, the previously collected TAP inventory scores (Torff, 2005) of the fourteen teachers were also assigned to each student within his/her classroom.

Instruments

The Teachers' Attitudes About Professional Development (TAP) scale seeks to assess teachers' beliefs about professional development initiatives (Torff and Sessions, 2005). Through an ongoing series of pilot testing and analyses from the original 44-item draft, the scale was narrowed to 5 items based upon effectiveness and validity (see Appendix A). The item-statements are assessed on a 6-point rating scale, ranging from

Strongly Agree (1) to Strongly Disagree (6). To protect against a response bias, two of the items are worded for reverse scoring. The scale boasts a high construct validity, as well as discriminant validity. Tested against measures of need for social approval (Crowne & Marlowe, 1964), need for cognition (Cacioppo & Petty, 1982), authoritarianism (Kohn, 1972), and teacher self-efficacy (Bandura, 1997), low correlations determined that the TAP scale accesses a construct that is distinguishable from others.

Procedure and Analysis

To determine the effect professional development has on student achievement, mean growth was calculated for students in the control and experimental groups. Growth is considered to be changes in NWEA Measures of Academic Progress (MAPs) testing data collected at two sequential time intervals in the Fall and Spring (T1 and T2). The RIT growth achieved between these two testing periods was measured for the Vocabulary strand and a mean growth calculated for both testing groups. An independent samples t-test was conducted to compare the mean growth of the two student groups.

As the relationship between professional development and student growth may depend upon whether teachers have a positive attitude (PD compliant) or a negative attitude (PD aversive) towards professional development activities, analyses were conducted to determine if teacher attitude moderates the relationship between professional development and student growth. The TAP inventory (Torff, 2005) was distributed online to middle school teachers as part of an ongoing professional development needs assessment by Chicago International Charter School. The scores of

the fourteen teachers selected for this study were assigned to the students within his/her classroom, and the correlation between these two variables was calculated to determine if there is a positive relationship between teacher attitude towards professional development and student growth.

To more thoroughly examine the potentially moderating effect of teacher attitude on the relationship between professional development and student performance, teacher TAP scores were centered based upon the population mean ($n=31$, $M=13.19$), and a new interaction variable was calculated (Aiken & West, 1996). Linear regression was conducted to determine if the interaction of teacher attitude and professional development attendance was significant above and beyond each variable alone. Simple slopes were then conducted after two groups were created based upon teacher TAP score: students of teachers who held a positive attitude towards professional development (PD Compliant), and students teachers who held a negative attitude towards professional development (PD Aversive). The mean score and standard deviation for all CICS TAP inventory participants ($n=31$) were calculated ($M=13.19$, $SD=4.57$). Students of teachers with scores at least 1SD above the mean were categorized as PD Compliant. Teachers with scores at least 1SD below the mean were categorized as PD Aversive.

Results

An independent samples t-test was conducted to compare the mean Vocabulary growth score on the NWEA MAPs assessment of students in classrooms of teachers who participated in professional development activities aimed to improve vocabulary skills against students in classrooms of teachers who did not participate in the activity. Table 2

summarizes the descriptive statistics and analysis results. Although students of teachers who participated in the Vocabulary professional development activity did produce a higher level of mean growth along the Vocabulary strand of the assessment ($M=8.90$, $SD=10.759$) than students of teachers who did not participate in the activity ($M=6.93$, $SD=8.921$), the disparity in growth between these two groups is not statistically significant, $t(290)=1.711$, $p=.088$. Interestingly, this nonsignificant trend is only observable along the Vocabulary strand of the assessment. The same growth disparity between the performance of both student groups is not observable along the Comprehension strand, the Literature strand, the Literary Works strand, nor the overall Reading growth scores.

Overall, there is not a significant correlation between teacher attitude towards professional development and student growth along the Vocabulary strand, $r(292)=-.096$, $p=.103$. However, within the student group of teachers who did attend the professional development activity, there is a significant correlation between teacher attitude towards professional development and student growth along the Vocabulary strand of the NWEA MAPs assessment, $r(144)=.202$, $p=.007$). Students of teachers with more positive attitudes towards professional development tended to demonstrate higher levels of growth within the subject strand of vocabulary than students of teachers who showed a less favorable attitude towards professional development. Although this relationship is considered to be weak ($.1 < r < .3$), it still supports the hypothesis that students of teachers who attended the vocabulary professional development activity, and held a positive attitude towards professional development, produced higher levels of growth than

students of teachers who did not attend the activity, as well as students of teachers who may have attended the PD, but held a negative attitude towards professional development.

Table 2. Independent samples t-test comparing Vocabulary growth of students whose teacher participated in professional development against the growth of students whose teacher did not participate in the activity.

Group Statistics

	AttendedPD	N	Mean	Std. Deviation	Std. Error Mean
OverallReadingGrowth	Yes	144	8.46	7.672	.639
	No	148	7.41	8.044	.661
Vocabulary	Yes	144	8.90	10.759	.897
	No	148	6.93	8.921	.733
Comprehension	Yes	144	8.95	11.442	.953
	No	148	7.07	11.201	.921
Literature	Yes	144	9.38	12.525	1.044
	No	148	8.39	13.523	1.112
LiteraryWorks	Yes	144	6.93	12.904	1.075
	No	148	7.91	13.324	1.095

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
OverallReadingGrowth	Equal variances assumed	.132	.717	1.137	290	.257	1.046	.920	-.765	2.858
	Equal variances not assumed			1.137	289.886	.256	1.046	.920	-.764	2.856
Vocabulary	Equal variances assumed	3.733	.054	1.711	290	.088	1.977	1.155	-.297	4.251
	Equal variances not assumed			1.707	277.498	.089	1.977	1.158	-.303	4.257
Comprehension	Equal variances assumed	.063	.801	1.422	290	.156	1.884	1.325	-.724	4.492
	Equal variances not assumed			1.421	289.313	.156	1.884	1.325	-.725	4.493
Literature	Equal variances assumed	.309	.579	.653	290	.514	.997	1.526	-2.007	4.001
	Equal variances not assumed			.654	289.301	.514	.997	1.525	-2.004	3.998
LiteraryWorks	Equal variances assumed	.159	.690	-.639	290	.523	-.982	1.536	-4.004	2.041
	Equal variances not assumed			-.640	289.994	.523	-.982	1.535	-4.002	2.039

The interaction term between teacher attitude and professional development attendance explained a significant increase in variance in student growth along the

vocabulary strand, $\Delta R^2 = .04$, $F(3, 228) = 3.973$, $p < .008$. Thus, teacher attitude towards professional development was a significant moderator of the relationship between vocabulary professional development attendance and student growth along the vocabulary assessment strand (see Figure 2). Students of teachers with positive attitudes towards the vocabulary professional development (+1SD TAP mean) demonstrated growth ($M=9.45$) along the vocabulary strand above and beyond the growth ($M=5.76$) produced by students of teachers with a negative attitude towards professional development (-1SD TAP Mean), as well as students of teachers who did not attend the professional development activity ($M=6.93$).

Post-hoc analyses reveal that there was not a significant difference in the levels of growth produced by students of teachers who attended the PD between campuses ($F=.277$, $p=.846$). This suggests students of teachers who attended the professional development activity exhibited similar levels of growth along the vocabulary strand, regardless of CICS campus. Further analysis reveals a growth disparity is nearly significant among teachers who did not attend the PD activity between campuses ($F=2.522$, $p=.084$). This suggests levels of vocabulary growth are not as stable across CICS campuses among students of teachers who did not attend the PD activity, and therefore, it was found that traditionally higher performing campuses produced higher levels of student growth. This finding supports the notion that specified professional development can help equalize the performance field among students at campuses or schools of varying baseline quality.

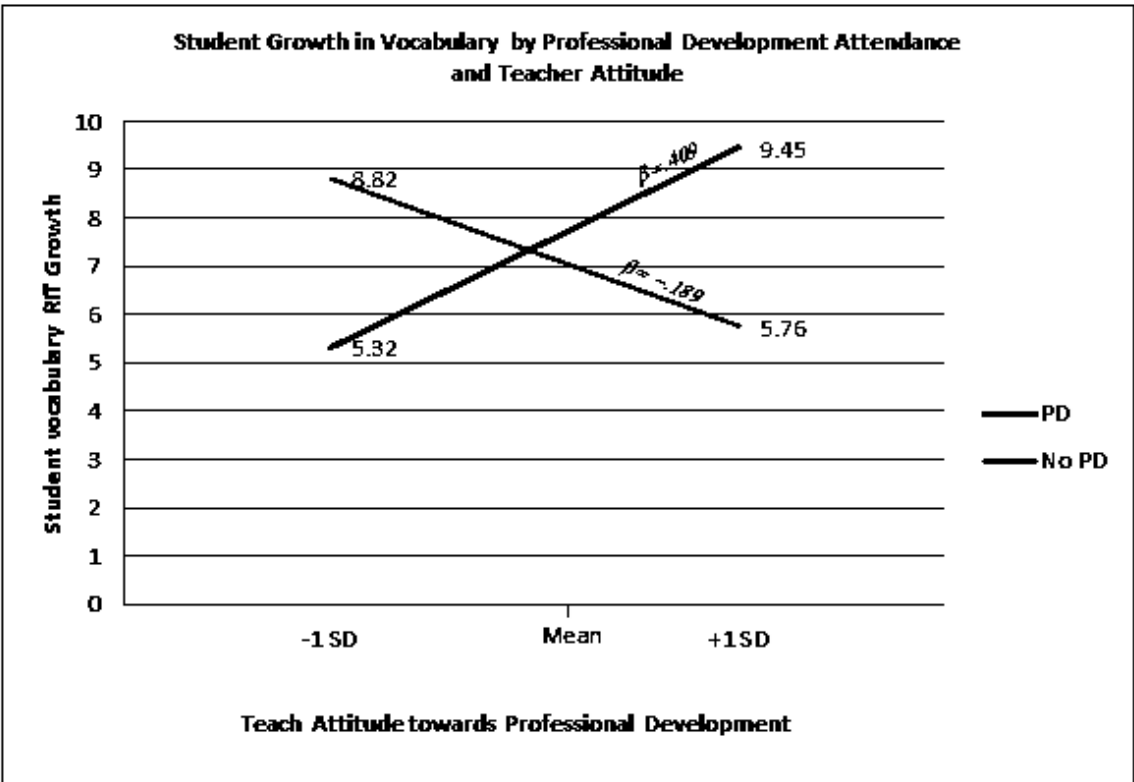
Discussion

Although not validated with statistical significance, a trend was found to support the hypothesis that focused professional development activities have the potential to directly impact student achievement. As these differences in mean growth scores between the two groups were only noted within the vocabulary strand of the assessment, it does indicate that the presence of the vocabulary professional development did have an impact on student performance along the vocabulary strand. Additional analyses revealed that teacher attitude toward professional development did impact the levels of growth produced among students of teachers who did participate in the professional development. The largest levels of growth were observed in students of teachers who participated in the professional development activity and held a more favorable attitude towards professional development

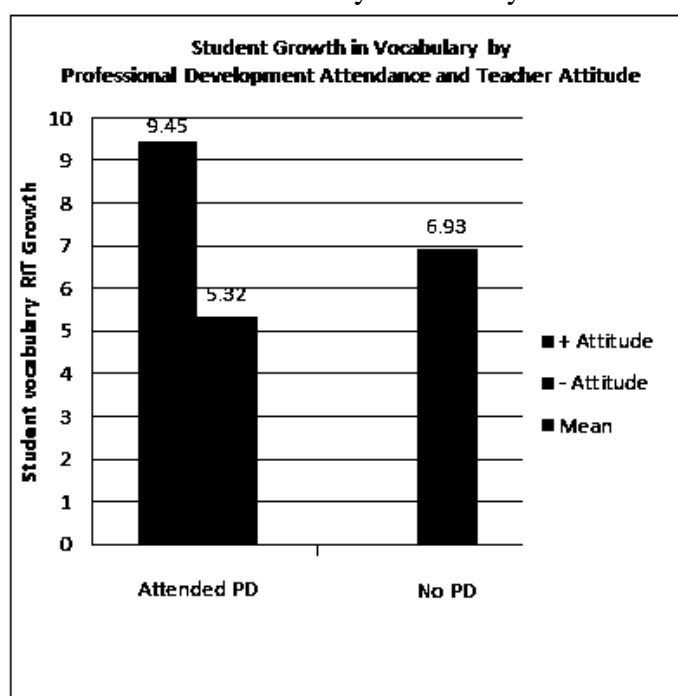
Post-hoc analyses reveal that there was not a significant difference in the levels of growth produced by students of teachers who attended the PD between campuses ($F=.277, p=.846$). This suggests students of teachers who attended the professional development activity exhibited similar levels of growth along the vocabulary strand, regardless of CICS campus. Further analysis reveals a growth disparity is nearly significant among teachers who did not attend the PD activity between campuses ($F=2.522, p=.084$). This suggests levels of vocabulary growth are not as stable across CICS campuses among students of teachers who did not attend the PD activity, and therefore, it was found that traditionally higher performing campuses produced higher levels of student growth. This finding supports the notion that specified professional

development can help equalize the performance field among students at campuses or schools of varying baseline quality.

Figure 2. The moderating effects of teacher attitude upon the relationship between attendance of vocabulary professional development and student growth in vocabulary.



.Figure 3. Mean vocabulary growth of students by teacher attitude towards professional development and attendance at the vocabulary PD activity.



It is worth noting that the highest performing campus also had teachers reporting the most favorable attitude towards professional development. This correlation could imply that professional development is extremely effective at this campus, as teachers are highly receptive to continuing education activities. However, it could also imply that these students would have performed well without the presence of the PD activity, as other variables may be influencing the results, such as student history, teacher motivation, or additional resources.

Other potentially confounding variables, such as grade and gender, did not impact the levels of growth along the vocabulary strand. One variable not collected in this study was the experience of individual teachers. As this was found to have an impact upon attitude towards professional development over time (Torff, 2008), it would be beneficial in the future to include this information in the survey portion of a similar experiment. It could be hypothesized that in this particular study, teacher experience is a significant variable in predicting student performance. There were some teachers who did not attend the vocabulary professional development and were PD averse, but still had students reporting higher levels of growth. This result could be the cause of variation in teacher experience.

The study could be easily built upon and replicated by CICS to measure growth and teacher impact within other testing strands. It could also be used by CICS to inform future professional development calendars and evaluate these continuing education activities. Additionally, this information could be shared with the educational management organizations (EMOs), who develop and implement the campus-specific curriculum and oversee staffing; it may allow this group to more appropriately allocate limited attention and resources.

As students of teachers who are PD compliant are yielding growth scores greater than those of teachers who are averse to professional development, this study serves not only to strengthen the credibility of professional development, but also highlights the moderating effect of teacher attitude on the relationship between professional

development and student achievement. This in itself may help some aversive teachers reevaluate the effectiveness of professional development and continuing education.

Exponentially beyond that, students will find themselves with additional support and understanding from all of these stakeholders. Because Chicago International Charter School is often in the city, state and national spotlight, as other schools and districts seek to discover and share best practices with regard to professional development, this study carries with it the potential information to produce true educational reform.

Limitations

It should also be noted that typically a hierarchical linear model analysis would be used to analyze the data in the testing, with the knowledge that these students are grouped so tightly with their teachers. However, the limited amount of teachers tested did not make this type of analysis a feasible option.

APPENDIX A

TEACHERS' ATTITUDES ABOUT PROFESSIONAL DEVELOPMENT (TAP)

SCALE

1. Professional development workshops often help teachers to develop new teaching techniques

1	2	3	4	5	6
Strongly Agree	Moderately Agree	Agree Slightly more than Disagree	Disagree Slightly more than Agree	Moderately Disagree	Strongly Disagree

2. If I did not have to attend in-service workshops, I would not.

1	2	3	4	5	6
Strongly Agree	Moderately Agree	Agree Slightly more than Disagree	Disagree Slightly more than Agree	Moderately Disagree	Strongly Disagree

3. Professional development events are worth the time they take.

1	2	3	4	5	6
Strongly Agree	Moderately Agree	Agree Slightly more than Disagree	Disagree Slightly more than Agree	Moderately Disagree	Strongly Disagree

4. I have been enriched by the teacher training events I have attended.

1	2	3	4	5	6
Strongly Agree	Moderately Agree	Agree Slightly more than Disagree	Disagree Slightly more than Agree	Moderately Disagree	Strongly Disagree

5. Staff development initiatives have not had much impact on my teaching.

1	2	3	4	5	6
Strongly Agree	Moderately Agree	Agree Slightly more than Disagree	Disagree Slightly more than Agree	Moderately Disagree	Strongly Disagree

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VITA

As the School Performance Director for the Colorado Charter School Institute, Kristen works in school accountability, accreditation and authorization at CSI. These duties include analyzing school performance data, conducting alignment studies between assessments, state and federal reporting, projections, setting targets and monitoring progress for 22 charter schools, serving over 10,000 K-12 grade students throughout the state of Colorado. She also does some independent statistics work with Denver area Catholic schools, and is a member of the Unified Improvement Planning state cadre, a group assembled to evaluate performance and facilitate improvement in all schools and districts across Colorado.

She currently holds an undergraduate degree in Psychology from Hillsdale College, with an emphasis in Biostatistics and Research Methods. She is working towards completion of her graduate degree in Applied Social Psychology at Loyola University Chicago. While in graduate school, she worked as a Data Analyst for Chicago International Charter School (CICS), one of the nation's largest charter schools, fostering her passion for the charter movement.

Her current research seeks to translate the benefits (or costs) of professional development into quantitative terms; it explores how teacher attitude moderates the relationship between continuing education and academic growth. She firmly believes that educational research of this capacity can be a springboard to drive and benefit an

entire school system. What appeals to Kristen as an undeniable advantage to this type of educational research in our current evolving academic system is the emphasis on a data-driven strategy for decision making. This type of information serves to drive classroom instruction and highlight the need for specific areas of improvement. Even beyond the walls of the school, this work serves to better inform parents, administration, and the community.