



Staying Power: The Impact of the TAP System
on Retaining Teachers Nationwide

Joshua H. Barnett & Tanee M. Hudgens
National Institute for Excellence in Teaching

October 2014

Table of Contents

Executive Summary.....	3
Introduction	4
Background	4
Research Questions and Design.....	7
Definitions.....	8
Sample.....	8
Table 1: Teacher Distribution within Sample by Year	9
Table 2: Number of Teachers and Schools, by State	9
Description of Data Sources.....	9
Measures.....	10
Table 3: SKR Scores by Teacher Role	11
Table 4: Classroom Value-Added Scores by Teacher Role.....	11
Analytic Strategy	12
Results.....	13
Retention Rate for TAP Schools	13
Table 5: Teacher Retention by State.....	13
Figure 1: Retention Rates in TAP Schools Relative to National Average and High-Need Schools..	14
Characteristics of Stayers, Movers, and Leavers	14
TAP School Stayers.....	14
Table 6: Teacher Role for Stayers, 2010-11 to 2011-12.....	14
Table 7: Teacher Role for Stayers, 2011-12 to 2012-13.....	15
TAP School Movers	15
Table 8: Teacher Role for Movers, 2010-11 to 2011-12	15
Table 9: Teacher Role for Movers, 2011-12 to 2012-13	15
TAP School Leavers	16
Administrator Survey Results.....	16
Figure 2: “The Implementation of TAP has helped retain effective teachers at my school.”	17
Figure 3: Administrator Survey Results on TAP Outcomes in their Schools	18
Discussion and Implications.....	18
References	21

Executive Summary

Each year teacher turnover presents instructional, organizational, and financial burdens that impact students, teachers, schools, and communities. High levels of teacher turnover drain valuable resources and make it difficult to build a high performing, stable teaching faculty. This is particularly true in high need schools where teacher attrition levels are higher than average. Efforts to understand why teachers leave and the associated impacts with such turnover are important and ongoing. This paper examines the impact of one model affecting hundreds of schools nationwide and the associated impacts on retention.

TAP™: The System for Teacher and Student Advancement was launched in 1999 as a comprehensive educator effectiveness model that offers career advancement and leadership opportunities for educators, as well as an evaluation process that is linked to job-embedded professional development and performance-based compensation. The TAP System focuses on developing human capital at each school through improving teacher instructional practices and student achievement. One additional impact often reported from educators in the field within the TAP System is the influence on teacher retention, which results from the culmination of various support structures for educators.

The current study examined teacher retention rates in schools that implemented the TAP System during the 2010-11, 2011-12, and 2012-13 school years for which data were available. Specifically, retention rates were examined across three types of teacher groups, those who: 1) taught continuously at the same TAP school (“TAP school stayers”); 2) transferred from one TAP school to another TAP school (“TAP school movers”); and 3) left TAP schools altogether (“TAP school leavers”).

Additionally, the current study examined characteristics of these three categories of teachers. Findings demonstrate the average TAP school retained more teachers than the average non-TAP school. Also, findings show that teachers who taught at TAP schools continuously, regardless of whether it was the same TAP school or a different TAP school, increased in their effectiveness from one school year to the next. Furthermore, the net value of the increased retention is equal to approximately the value of an additional teacher in the school.

Key findings from this study include:

- With a national retention rate of 94%, TAP schools retain approximately 14% more teachers compared to similar types of high-need schools.
- TAP teachers who were retained in the same school improved their instructional skills.
- TAP teachers who were retained in the same school improved their classroom value-added scores.
- TAP teachers who moved to another TAP school improved their instructional skills.
- TAP teachers who moved to another TAP school improved their classroom value-added scores.
- TAP principals overwhelmingly acknowledge the value of the TAP System in retaining their most effective teachers.
- TAP schools save over \$50,000 per year in teacher attrition costs, which is the approximate value of having an additional teacher on site.

Introduction

With approximately 3.5 million workers, public school teaching is the largest profession in the United States (Headden, 2014). In recognizing the impact of teachers on our nation's overall prosperity, policymakers and the public have increasingly focused on ways to increase student learning in all grades, subjects, and schools. Amid this accountability movement in America's educational system, a growing concern exists regarding the provision and maintenance of quality teachers in the K-12 educational system.

Over the past three decades, numerous articles, reports and commissions have described teacher shortages (Beaudin, 1993; Bullock & Scott, 1993; Guarino, Santibanez, & Daley, 2006; Ingersoll, 2003, 2004; Ingersoll & Smith, 2003; Johnson, Berg, & Donaldson, 2005; Kaiser & Cross, 2011; Keigher, 2010; Luekens, Lyter, Fox, & Chandler, 2004; National Commission on Teaching and America's Future, 2007; Shen, 1997). However, a continuing argument suggests the teacher shortage problem is as much of a challenge in retaining talent as it is in recruiting talent into the profession (Borman & Dowling, 2008; Donaldson, 2012; Johnson et al., 2005; Johnson, Kraft, & Papay, 2012; Simon & Johnson, 2013; TNTP, 2012). The crisis of retention, aptly referred to as the schoolhouse "revolving door" (Ingersoll, 2001), has lasting achievement, organizational, and financial costs to schools.

The estimated financial cost of attrition, coupled with its impact on student learning, has caused educators, researchers, and policymakers to conclude that policies focused on retaining teachers are essential to improving student outcomes. One comprehensive reform model – TAP™: The System for Teacher and Student Advancement – is working with schools across the nation to improve the practice of teachers, build capacity at the local level, and provide a sustainable model for increasing overall teacher quality. The effects of the TAP System for improving teacher practices and student achievement are well documented (Barnett, Rinthapol, & Hudgens, 2014; Buck & Coffelt, 2013; Daley & Kim 2010; Hudson, 2010; Jerald & Van Hook, 2011; Mann, Leutscher, & Reardon, 2013; Schacter, Thum, Reifsneider, & Schiff, 2004; Schacter & Thum, 2005; Solmon, White, Cohen, & Woo, 2007). Notwithstanding those impacts, this study investigates the impact of the TAP System on a different dimension – the ability to retain teachers. Drawing on the literature of teacher retention, this work also proposes an estimated financial cost associated with retention in TAP schools.

Background

The national teacher turnover rate continues to increase across America's public schools (Ingersoll & Merrill, 2012; Shockley, Guglielmino, & Watlington, 2006). On average, high-poverty public schools lose approximately 20% of their faculty each year (Ingersoll, 2002). Glibly, the average student is retained in some schools longer than the average teacher.

These numbers are even more dramatic and discouraging in America's neediest schools (Allensworth, Ponisciak, & Mazzeo, 2009; Alliance for Excellent Education, 2005; Hanushek, Kain, & Rivkin, 2004; Hemphill & Nauer, 2009; Marinell & Coca, 2013; Liu, Rosenstein, Swan, & Khalil, 2008; Loeb, Darling-Hammond, & Luczak, 2005). Further, in these highest-need schools, there remain "shallow applicant pools" from which to select new teachers (Simon & Johnson, 2013, p. 6). The negative effects of high turnover, limited applicants, and emergency certification for high-need subject teachers impacts many

of America's schools, contributing to low achievement and perpetual achievement gaps.

The U.S. Department of Education's National Center for Education Statistics (NCES) provides a comprehensive source of teacher data on attrition, mobility, and retention among elementary and secondary teachers across the 50 states and the District of Columbia through its Schools and Staffing Survey (SASS) and Teacher Follow-Up Survey (TFS). Multiple examinations of these data suggest a need for concern regarding K-12 teacher attrition rates for two reasons.

First, there is evidence that the teacher turnover rate is higher than that of other occupations, including higher education, legal, and medical fields (Ingersoll & Merrill, 2010). In a comparison of SASS and TFS data to data from the Bureau of Labor Statistics, Ingersoll (2003) found the 2000-01 teacher turnover rate to be 16%, exceeding the 11% national average turnover for other nonteaching professions. Additionally, there is evidence of an increase in teacher turnover over recent years. In an examination of multiple cycles of SASS data, Ingersoll and Merrill (2010) found that teacher turnover rates increased by 28% since the early 1990s. The teacher turnover rate was 13% in 1991-92 and 17% in 2004-05. More recent research finds similarly distressing results. Goldring, Taie, and Riddles (2014) categorized teachers from the 2011-12 Schools and Staffing Survey and the 2012-13 Teacher Follow-up Survey, the most recent years for which data are available. Data show 84% of public school teachers were stayers (remained in the same school), 8% were movers (transitioned to a different school), and 8% were leavers (left the teaching profession). These statistics represent a decrease in stayers – individuals remaining at the same school. Results from the 2007-08 SASS and the 2008-09 TFS show 85% of public school teachers were stayers (Keigher, 2010).

Second, the challenge of retaining teachers is more severe in certain school types, including urban and rural schools and those with high minority student populations. In an examination of SASS and TFS data, Ingersoll (2004) found that for the 2000-01 year, the annual teacher turnover for urban high-poverty schools was 22%, compared to 16% in rural high-poverty schools, and 13% in low-poverty schools. Data from the 2003-04 school year show similar patterns: 21% of teachers in high poverty schools, compared to 14% in low-poverty schools (Planty et al., 2008). These same data show charter schools also have high teacher turnover rates. Stuit and Smith (2010) found that 25% of charter school teachers, compared to 14% of traditional public school teachers, left their teaching positions during the 2003-2004 school year.

Beyond the understanding that many teachers are leaving the field and that those exits are proportionally higher in high-need schools, there is an abundance of research examining reasons for teacher attrition (i.e. Boyd, Lankford, Loeb, & Wyckoff, 2005; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Hanushek et al., 2004; Johnson, 2004; Podgursky, Monroe, & Watson, 2004; Simon & Johnson, 2013; Weiss, 1999). Scholars have also begun to explore the relationship between teacher turnover and teacher effectiveness, specifically whether teachers who leave are more or less effective than their counterparts who remain teachers. There is some evidence to suggest that teachers who transfer schools and leave teaching generally tend to be less effective than those who remain (Hanushek, Kain, O'Brien, & Rivkin, 2005). Goldhaber, Gross, and Player (2007) examined attrition, mobility, and value-added measures of North Carolina public school teachers and discovered that more effective teachers were less likely to leave teaching. Similarly, Boyd et al. (2009) found that beginning teachers who were less effective in improving student scores in math had higher attrition rates than more effective teachers. Although these studies suggest less effective teachers are the ones leaving, complementary research suggests these less effective teachers are typically replaced by teachers

possessing similar or lower characteristics. Schools with high levels of turnover tend to fill these vacancies with novice teachers, who generally tend to be less effective than more experienced teachers (Boyd et al., 2009; Grissom, 2011; Hanushek & Rivkin, 2010; Milanowski & Odden, 2007; Papay & Johnson, 2011; Peske & Haycock, 2006; Rockoff, 2004). Further, new teachers have higher attrition rates than more experienced teachers (Kaiser & Cross, 2011), which perpetuates the aforementioned “revolving door.”

The culminating consequence of teacher turnover clearly affects students’ performance and future opportunities (Achinstein, Ogawa, Sexton, & Freitas, 2010; Allensworth et al., 2009; Balu, Beteille, & Loeb, 2010; Clotfelter, Ladd, & Vigdor, 2005; Clotfelter, Ladd, & Vigdor, 2011; Guin, 2004; Ingersoll, 2001; Johnson et al., 2005; Rivkin et al., 2005; Rockoff, 2004; Ronfeldt, Loeb, & Wyckoff, 2013). However, the effect of teacher turnover is much more insidious than singular connections to student achievement, as the effect of turnover creates a downward spiral in most schools for morale, school culture, and financial stability (Birkeland & Curtis, 2006; Donaldson, 2012; Neild, Useem, Travers, & Lesnick, 2003).

Beyond the achievement effects, researchers have also investigated the financial costs of teacher turnover. Researchers who examined these numbers reported a cost of \$2.2 billion for teachers exiting the profession and a total cost of approximately \$5 billion in all educator attrition (Alliance for Excellent Education, 2005). The National Commission on Teaching & America’s Future estimates teacher turnover costs schools \$7,340,000,000 each year (NCTAF, 2007) with an average annual cost of approximately \$50,000 per school.

Additional research examined the costs at the local level (Barnes, Crowe, & Schaefer, 2007; Milanowski & Odden, 2007; Shockley, Guglielmino, & Watlington, 2006; Staiger & Rockoff, 2010). In one study of five school districts, the cost per teacher who left a school was \$4,366 in the small rural district of Jemez Valley, New Mexico and just under \$10,000 in Granville County, North Carolina. The average cost per teacher leaver was \$15,325 in Milwaukee and \$17,872 in Chicago, Illinois (Headden, 2014; NCTAF, 2007). However, low-performing schools may need to spend on average an additional \$67,000 more each year compared to their high-performing peers due to emergency and unfilled position costs (Barnes et al., 2007).

Notwithstanding these figures, Simon and Johnson (2013) posit turnover costs are likely much higher than generally reported, “as these calculations do not account for the additional expenses associated with the loss of human capital and related productivity as students are repeatedly taught by beginning teachers...” (p. 8). The Texas Center for Educational Research (2000) explained the total cost of turnover includes recruitment, hiring, induction, professional development, as well as separation costs (i.e. closing out payroll accounts, service records, appointment documentation, background checks). Based on a review of schools across the state, the Texas Center for Educational Research (2000) estimated the cost of attrition to range from 25% to 200% of the departing teacher’s salary. The Chicago Association of Community Organizations for Reform Now (ACORN, 2004) performed a similar investigation across sixty-four Chicago elementary schools and found an approximate attrition cost of \$63,689 per teacher.

Other researchers have gone beyond the associated teacher costs, to investigate the long-term costs on students’ future earnings and include those as part of the turnover costs; consequently, they calculated a turnover cost with compounded interest for each child and each year of the child’s potential

contribution to society through taxes and income. This expansion of attrition costs is summarized by Neild, Useem, Travers, and Lesnick (2003), who explain when turnover becomes the norm, it “impede[s] development of a coherent educational program, institutional memory, and staff cohesion” (p. 14). These effects are then borne not only by the school personnel and taxpayers, but also by the students - forever.

Recognizing the importance of attrition in education, numerous scholars have attempted to determine the true impact and cost of teacher turnover (see Borman & Dowling, 2008 and Simon & Johnson, 2013 for thorough literature reviews). However, while the overall costs of attrition are difficult to pinpoint and debatable, the evidence is clear that these costs are high – ranging in schools from several thousand to tens of thousands per teacher leaver.

Understanding the instructional, financial, and organizational costs associated with attrition, numerous policy initiatives and programs are dedicated to attracting and retaining highly effective teachers, including the federal initiatives (i.e. Teacher Quality Partnership grants; Teacher Incentive Fund grants; School Improvement grants). Local and state agencies have also made considerable investments in recruiting and retaining effective teachers (i.e. Minnesota’s Q-Comp; Denver’s ProComp; Texas’s Educator Excellence Grants and District Awards for Teacher Excellence). The theory of action underwriting each of these initiatives is that improved hiring practices, improved opportunities within the school, and improved professional development of teachers at the school will yield a positive result on teacher quality and student achievement.

Expounding on this theory of action, Simon and Johnson (2013) posit, “...policymakers and practitioners who wish to retain talented, effective teachers in high-poverty, hard-to-staff schools must pursue retention strategies that are designed to improve the teaching environment” (p. 4). One comprehensive reform model which works toward that goal is TAP™: The System for Teacher and Student Advancement. Managed and supported by the National Institute for Excellence in Teaching (NIET), the TAP System was launched in 1999 as a comprehensive, research-driven educator effectiveness model committed to ensuring a highly skilled, strongly motivated, and competitively compensated teacher for every classroom in America (www.niet.org).

Research examining the TAP System has demonstrated a consistent pattern of improving the instructional ability of educators and increasing student achievement (Algiers Charter School Association, 2011; Barnett, Rinthapol, & Hudgens, 2014; Daley & Kim 2010; Hudson, 2010; Eckert, 2013; Mann, Leutscher, & Reardon, 2013; Schacter et al., 2004; Schacter & Thum, 2005; Solmon et al. 2007). Recognizing the effects of TAP and the need for reforms that improve retention, the current study explores teacher retention in schools across ten states that implemented the TAP System. Using data from the 2010-11, 2011-12, and 2012-13 school years, this study examined teachers who remained in TAP schools over time, those who transferred across TAP schools, and those who left TAP schools altogether.

Research Questions and Design

The goal of this study was to examine teacher retention in schools that implemented the TAP System in 2010-11, 2011-12, and 2012-13 across four research questions and corresponding sub-questions:

1. What is the retention rate at TAP schools compared to the national rates?
 - a. What is the percentage of teachers who stay at TAP schools (TAP stayers)?
 - b. What is the percentage of teachers who switch TAP schools (TAP movers)?
 - c. What is the percentage of teachers who leave TAP schools (TAP leavers)?
2. What are the characteristics of teachers who stay at, switch and leave TAP schools?
 - a. Do the characteristics of stayers change over time?
 - b. Do the characteristics of movers change over time?
 - c. What do we know about the leavers?
3. What are the reported effects of the TAP System on retention from principals?
4. Is there an added cost-benefit to retaining teachers in a TAP school?

Definitions

The first challenge in any study of understanding retention or attrition is how to define these seemingly simplistic terms. Following Ingersoll's lead, we define turnover broadly as "the departure of teachers from their schools" (2001, p. 500). While the nuances of classifying departing teachers does little to assuage the challenge of their absence – that is, schools are left to deal with a replacement teacher and all associated costs regardless if the teacher retired after years of service, quit teaching on the first day, or migrated into a different educational position within the school or district – such distinctions are helpful in understanding the patterns of teacher retention.

For this reason, we followed the established pattern used by previous scholars (e.g. Ingersoll, 2001; Johnson & Birkeland, 2003; Johnson, 2004; Johnson, et al., 2005; Luekens et al., 2004), and we employed the terms "stayers," "movers," and "leavers." The Teacher Follow-Up Survey collects information regarding where teachers go once they leave a school, allowing for distinctions to be made within teacher loss, thus the aptly titled "mover" and "leaver" categories. Generally, "movers" are teachers who move to a different school and "leavers" are teachers who leave the profession. "Stayers" are defined as teachers who continue teaching at the same school in consecutive years (Luekens et al., 2004).

In this study, we used a more narrow definition of stayers, movers, and leavers, as they are related to their relationship in a TAP school. Specifically, a "TAP school stayer" was defined as a teacher who taught at a TAP school for one year and who returned to the same school the next year – remaining at the same school in consecutive years. A "TAP school mover" was a teacher who taught at TAP schools for consecutive years, but switched TAP schools from one school year to the next – remaining in the database, but changing school placements. A "TAP school leaver" was defined as a teacher who taught at a TAP school one year, but did not teach at a TAP school the next year – exiting our database in a subsequent year. For example, a teacher would be counted as a leaver if he or she was in the database for 2010-11, but missing in 2011-12, or in the database for 2011-12, but missing in 2012-13. The leaver designation also includes teachers who left the teaching profession as well as those who took teaching jobs at other non-TAP schools. By this classification system, we may reasonably expect our "leaver" category to be much larger than prior studies, who only count leavers as those who exit the profession.

Sample

Analysis of teacher retention outcomes drew from a sample of 12,095 teacher-level records, representing 413 schools in 10 states. These teachers taught at schools that implemented the TAP

System during the 2010-11, 2011-12, or 2012-13 school years. Over 95% of these schools qualify as a high-need (i.e. Title 1) school. The number of teachers, schools, and states, along with a breakdown of teachers by teacher role, is presented for each school year in Table 1. As noted on Table 1, the TAP System has expanded steadily in the number of schools participating, yet the proportion of teachers by teacher role has stayed consistent over time.

Table 1: Teacher Distribution within Sample by Year

	2010-11	2011-12	2012-13
Number of States	8	9	10
Number of Schools	154	319	359
Number of Teachers	3,146	8,094	10,675
% Career Teachers	80.55%	81.81%	82.17%
% Mentor Teachers	13.03%	12.19%	11.92%
% Master Teachers	6.42%	5.99%	5.91%

Beyond examining the retention rates in TAP schools nationally, we examined the retention levels across participating TAP states. Table 2 shows the number of teachers and schools by state each year.

Table 2: Number of Teachers and Schools, by State

	2010-11		2011-12		2012-13	
	Teachers	Schools	Teachers	Schools	Teachers	Schools
Arizona	378	22	1,315	53	1,823	64
Arkansas	64	3	137	8	164	8
California ¹	-	-	-	-	129	6
Colorado	128	1	373	11	249	10
Indiana	-	-	1,083	42	1,341	45
Louisiana	950	52	1,784	79	2,156	79
Minnesota	55	3	74	3	111	3
South Carolina	679	35	1,123	47	1,687	64
Tennessee	110	4	571	18	703	18
Texas	782	34	1,634	58	2,312	62
Total	3,146	154	8,094	319	10,675	359

Description of Data Sources

Data for the current study come from the Comprehensive Online Data Entry (CODE) System used by NIET to track teacher observations, value-added scores, and school data. CODE is a Web-based system that provides secure access to real-time data. These data allow for a comparison of annual lists of teachers to determine which teachers are working at and which teachers are no longer teaching at individual schools, as well as the role each teacher has within the school. The teacher counts were also

¹ California teachers and schools are only noted on Table 2 as including teachers in the 2012-13 school year; these teachers, schools and the state are not included in the analysis below as no prior information was available for them.

checked against roster lists with state project directors in each location to help determine any needed instances of data cleaning and clarification. The TAP Administrator Survey is an annual survey given to all administrators in TAP schools. The instrument includes 27 survey items with sub-questions, and two open-ended items for a total of 102 items.

Measures

To understand the impact of the TAP System, a brief discussion of what TAP is and how it works is needed. Introduced in 1999, the TAP System has become the leading comprehensive educator effectiveness model that offers career advancement and leadership opportunities for educators, a fair and transparent evaluation process that is linked to job-embedded professional development and performance-based compensation. Each of the four core elements within the TAP System is discussed below. For more information, visit www.niet.org.

- Multiple career paths. In TAP schools, skilled teachers have the opportunity to serve as master and mentor teachers, receiving additional compensation for providing high levels of support to career teachers and increasing instructional effectiveness across the faculty. Master and mentor teachers form a leadership team, along with administrators, to deliver school-based professional support and conduct evaluations with a high level of expertise.
- Ongoing applied professional growth. Led by master and mentor teachers, TAP teachers participate in weekly cluster group meetings where they examine student data, engage in collaborative planning, and learn instructional strategies that have been field-tested in their own schools. Teachers benefit from a national TAP database of instructional strategies and their colleagues' experiences. Professional development continues in the classroom as master teachers model lessons, observe classroom instruction, and support teachers' pedagogical improvement.
- Instructionally focused accountability. TAP teachers are observed in classroom instruction several times a year by multiple trained observers, including principals and master and mentor teachers, using rubrics for several dimensions of instructional effectiveness. Evaluators are trained and certified, and leadership teams monitor the reliability and consistency of evaluations in their schools. These classroom evaluations are complemented by analyzing student achievement growth, rounding out a multi-measure system of teacher evaluation. Evaluation results are used as formative feedback in one-on-one mentoring sessions, and guide planning for cluster group meetings.
- Performance-based compensation. TAP teachers have the opportunity to earn annual bonuses based on their observed skills, knowledge and responsibilities, their students' average achievement growth, and schoolwide achievement growth. Master and mentor teachers receive additional compensation based on their added roles and responsibilities, and principals can earn additional compensation based on schoolwide achievement growth and other measures of effectiveness.

TAP schools use multiple measures to assess teacher performance, including the effectiveness of the instruction and student learning growth at the classroom and school level. Instructional impacts are measured through a series of observations using the TAP Teaching Standards, which culminate in a Skills, Knowledge, and Responsibilities score.

Skills, Knowledge, and Responsibilities Scores. Teachers are observed multiple times a year (generally four times) by multiple certified raters (generally by the school principal and master teachers) on 19 indicators of instructional practice. Observation scores are combined through a weighted average with

seven responsibility indicators to create an overall Skills, Knowledge, and Responsibilities (SKR) score for each teacher. “Skills” and “Knowledge” scores are comprised of a multi-tiered percentage breakdown of various research-based pedagogical best practice components related to instructional delivery. Each of these are clearly defined and outlined in the TAP rubric domains (Instruction, Designing and Planning Instruction, and the Learning Environment). “Responsibility” scores are comprised of a teacher’s response and impact on staff development, instructional supervision, and mentoring if you are a master teacher or mentor teacher. “Responsibility” scores also include community involvement, school responsibilities, growing and developing professionally, and level of reflection on teaching for all levels of teachers within the TAP System. The weighted scores from each indicator are combined to create an overall TAP SKR score, which ranges from a 1.0 (unsatisfactory performance) to 5.0 (exemplary performance) in half point increments. Table 3 provides a description of the scores by year by teacher role.

Table 3: SKR Scores by Teacher Role²

	2010-11		2011-12		2012-13	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Career Teacher	2,478	3.24 (.49)	6,522	3.15 (.46)	8,617	3.16 (.47)
Mentor Teacher	398	3.66 (.48)	972	3.57 (.42)	1236	3.63 (.41)
Master Teacher	189	3.92 (.78)	474	4.01 (.46)	604	4.05 (.49)
All Teachers	3,065	3.33 (.55)	7,968	3.25 (.52)	10,457	3.27 (.53)

Classroom Growth/Value-Added Scores. Classroom value-added scores are the achievement growth of a teacher’s or school’s students during a school year. A student’s test scores are matched to his or her own prior scores and mapped against similar performing students to measure the student’s progress (or growth) during the year. Scores are converted from the original test metric by a third party vendor (TAP schools in different states work with different agencies using their local measures to obtain teacher and school growth scores) into a 1 to 5 scale (in whole numbers) indicating how the teacher’s average student growth compares to the average student growth for teachers of the same subject with similar students. Scores on the scale range from 1 (much less than a year’s growth) to 5 (much more than a year’s growth), with a 3 representing one year’s growth and a 2 and 4 representing less and more than a year’s growth respectively. Table 4 provides a description of the growth scores by year by teacher role.

Table 4: Classroom Value-Added Scores by Teacher Role³

	2010-11		2011-12		2012-13	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Career Teacher	747	3.45 (1.19)	1,982	3.15 (1.18)	3,474	3.14 (1.07)
Mentor Teacher	149	3.60 (1.22)	399	3.27 (1.18)	554	3.34 (1.07)
Master Teacher	13	3.54 (1.13)	36	3.03 (1.11)	134	3.28 (0.87)
All Teachers	909	3.47 (1.19)	2,417	3.17 (1.18)	4,162	3.17 (1.07)

² Data for Table 3 show small decreases in the total population due to those teachers without SKR scores, approximately 2% of teachers.

³ Data for Table 4 show smaller participant values due to the lower number of teachers with classroom value-added scores. Traditionally, these scores are computed only for those teachers with two years of standardized test score data and sufficient student-teacher linkages. Further, many master teachers serve as instructional leads within the school and may not be connected to a single classroom value-added score, thus the low numbers.

TAP Administrator Survey. The TAP Administrator survey was administered electronically through a third-party vendor who warehoused all responses. Survey codes were generated for each participant by the third-party vendor and provided to the participants via Project Directors in each site. The administrators were also given a Web address to access the survey. Upon accessing the survey, each administrator was able to complete the survey using his or her assigned code. Administrators also had the option to use a “generic code”, which was provided to them. The survey consisted of a series of five-point, Likert-type items (Likert, 1932) ranging from “strongly disagree” to “strongly agree”. The survey was open for participation from April 15 through June 30, 2013. For the 2012-13 school year, 484 of 995 administrators completed the survey, of whom 46% were principals, 45% were assistant principals, and 9% were other leaders at the school (i.e. Director of Curriculum; Director of Instruction; Chief Turnaround Officer).

Analytic Strategy

To examine the first research question related to the retention rate for schools implementing TAP, teachers were categorized into TAP school stayers, TAP school movers, and TAP school leavers. If a teacher was in the CODE database for two consecutive years at the same school, the teacher was coded as a stayer. Teachers in the database for two consecutive years, but at different TAP schools at those time points were coded as movers. Finally, teachers who were in the CODE database one year, but absent from the database the following year were assumed to no longer teach at a TAP school and were listed as leavers. Descriptive statistics are used to understand the number and proportion of teachers in each group.

To examine the second research question, descriptive statistics were employed to better understand characteristics of the teachers in the three teacher retention categories. The number of states and schools the teachers came from, along with teacher role breakdown, were examined. Paired samples *t*-tests were used to examine teacher effectiveness scores for Skills, Knowledge, and Responsibilities (SKR) measure and classroom value-added scores over time for TAP school stayers and movers. For TAP school leavers, mean scores for SKR and classroom value-added were inspected to understand who left. Additionally, effect size calculations using Cohen’s *d* were employed to understand the relative impact of the retention levels across time.

To examine research question three, a “retention” construct question was created using five survey items. Those items were:

- TAP has made it easier for me to hire good teachers.
- The implementation of TAP has attracted more inquires about teaching positions at my school.
- TAP is attracting better quality applicants for open teaching positions.
- TAP has increased the quantity of applicants for open teaching positions.
- The implementation of TAP has helped retain effective teachers at my school.

The internal reliability of this construct is high, $\alpha = 0.92$, across the five items, which exceeds the generally accepted standard of 0.70 (Nunnally, 1978).

To examine research question four, a cost estimate for retaining teachers was drawn from the aforementioned literature base on teacher retention. This cost estimate was applied to the percentage difference between teachers in TAP schools compared to similar schools. This difference between the percentage of teachers was then applied to a representative school with 40 teachers to provide an

estimate of savings at the school level.

Results

Retention Rate for TAP Schools

The first question for the current study was to examine teacher retention in schools that implemented the TAP System across three school years, 2010-11, 2011-12 and 2012-13⁴.

The vast majority of teachers were identified as stayers, 93.9% from 2010-11 to 2011-12 and 94.5% from 2011-12 to 2012-13. The next largest group of teachers was the movers, 3.6% in 2010-11 to 2011-12 and 2.8% in 2011-12 to 2012-13. The remaining 2.5% and 2.8% were leavers, in 2010-11 to 2011-12 and 2011-12 to 2012-13, respectively. Table 5 displays summary statistics for the three groups (stayers, movers, and leavers) by state.

For 2010-11 to 2011-12, the percentage of stayers ranged from a low of 92.7% to a high of 99.2% with an average value of 93.9%. From 2011-12 to 2012-13, the percentage of stayers ranged from a low of 91.2% to a high of 97.3% with an average value of 94.5%. With an overall average retention rate of 94%, this finding exceeds the previously discussed national figure of approximately 84% for all schools and 80% for high-need schools. Given that 97% of TAP schools are high-need schools, the comparison to the national average and high-need school average is appropriate. Figure 1 illustrates the average difference of retention levels in TAP schools.

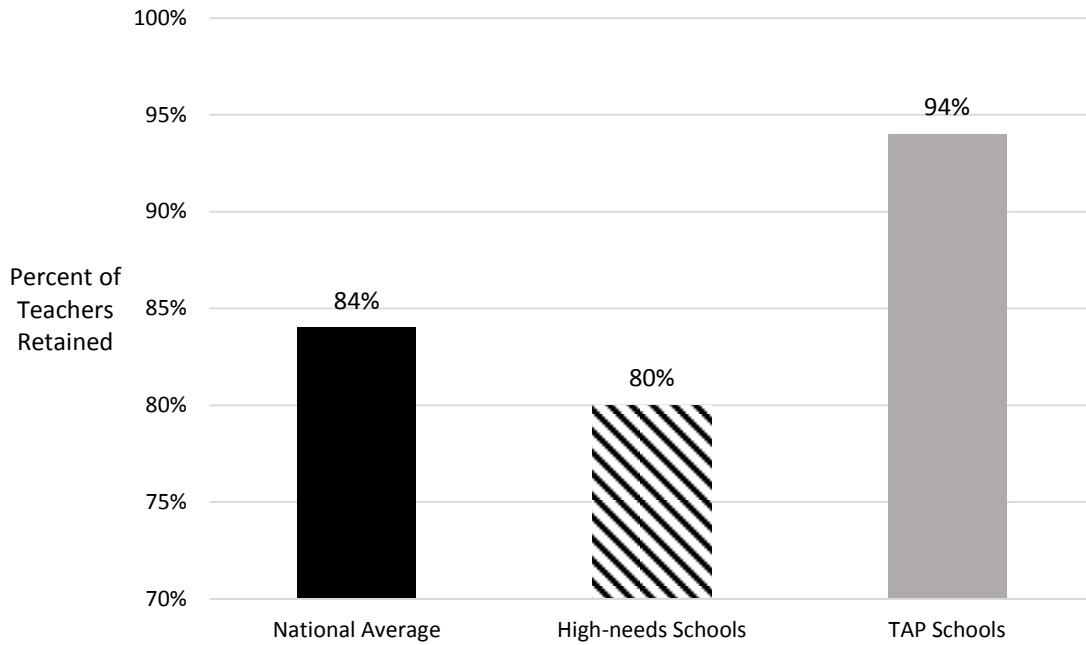
Table 5: Teacher Retention by State⁵

	2010-11 to 2011-12				2011-12 to 2012-13			
	# of Teachers	Stayers	Movers	Leavers	# of Teachers	Stayers	Movers	Leavers
Arizona	315	92.7%	3.2%	4.1%	1,163	92.3%	4.0%	3.8%
Arkansas	64	96.9%	1.6%	1.6%	137	91.2%	5.8%	2.9%
Colorado	128	99.2%	-	0.8%	220	95.0%	1.4%	3.6%
Indiana	-	-	-	-	1,083	96.3%	1.8%	1.9%
Louisiana	898	93.4%	3.0%	3.6%	1,169	93.7%	3.2%	3.2%
Minnesota	55	92.7%	-	7.3%	74	97.3%	-	2.7%
South Carolina	678	93.8%	4.3%	1.9%	1,062	95.4%	3.5%	1.1%
Tennessee	110	94.5%	2.7%	2.7%	571	94.9%	3.2%	1.9%
Texas	781	93.7%	5.1%	1.2%	1,438	94.7%	1.6%	3.7%
Overall	3,029	93.9%	3.6%	2.5%	6,917	94.4%	2.8%	2.8%

⁴ Schools that stopped implementing the TAP System were not included in the analysis, as they were determined to not be a TAP School in the following year. As a result, 117 teachers from the 2010-11 year and 1,177 teachers from the 2011-12 year were not classified.

⁵ Percentages may not sum to 100 due to rounding.

Figure 1: Retention Rates in TAP Schools Relative to National Average and High-Need Schools



Beyond looking at overall retention, the second research question in this study asks about the types of retention and the characteristics of each group of teachers.

Characteristics of Stayers, Movers, and Leavers

TAP School Stayers

The 2,843 teachers who were teaching in the same school in the 2011-12 school year as in the 2010-11 school year taught in 139 schools in 8 states. The 6,534 teachers who continued to teach at the same TAP school from 2011-12 to 2012-13 came from 279 schools in 9 states. Approximately 8% of the 2010-11 to 2011-12 stayers and 7% of the 2011-12 to 2012-13 stayers changed teacher roles from one school year to the next. The majority of these teachers advanced professionally, experiencing changes from career to mentor teachers, or from mentor to master teachers (Table 6 and Table 7).

Table 6: Teacher Role for Stayers, 2010-11 to 2011-12

		Teacher Role 2011-12			
		Career	Mentor	Master	Total
2010-11	Teacher Role	2,200	125	7	2,332
		66	269	26	361
		5	4	141	150
	Total	2,271	398	174	2,843

Table 7: Teacher Role for Stayers, 2011-12 to 2012-13

		Teacher Role 2012-13			
		Career	Mentor	Master	Total
Teacher Role 2011-12	Career	5,077	267	13	5,357
	Mentor	122	634	54	810
	Master	11	11	345	367
	Total	5,210	912	412	6,534

Teacher performance was examined for stayers using SKR scores. For stayers, SKR scores increased from 2010-11 ($M = 3.32$; $SD = 0.54$) to 2011-12 ($M = 3.44$; $SD = 0.51$), $t(2761) = 14.42$, $p = .00$, $d = 0.23$. Additionally, SKR scores increased from 2011-12 ($M = 3.25$; $SD = 0.50$) to 2012-13 ($M = 3.39$; $SD = 0.51$), $t(6412) = 28.84$, $p = .00$, $d = 0.28$.

Teacher performance was also examined using change in classroom value-added scores of stayers from 2010-11 ($M = 3.51$; $SD = 1.18$) to 2011-12 ($M = 3.42$, $SD = 1.14$), $t(728) = 1.76$, $p = .08$, $d = 0.08$. Performance as measured through classroom value-added scores was also examined from 2011-12 ($M = 3.19$, $SD = 1.16$) to 2012-13 ($M = 3.25$; $SD = 1.13$), $t(1604) = 2.03$, $p = .04$, $d = 0.05$.

TAP School Movers

The 110 teachers who switched from one TAP school in 2010-11 to another TAP school in 2011-12 came from six states. The 191 teachers who switched from one TAP school in 2011-12 to another TAP school in 2012-13 came from eight states. Approximately one-quarter of the movers from 2010-11 to 2011-12 and from 2011-12 to 2012-13 changed teacher roles from one school year to the next. This number is approximately three times higher than that of stayers, which indicates that those who are moving between schools are generally taking advanced professional positions when switching roles as illustrated on Table 8 and Table 9.

Table 8: Teacher Role for Movers, 2010-11 to 2011-12

		Teacher Role 2011-12			
		Career	Mentor	Master	Total
Teacher Role 2010-11	Career	63	7	2	72
	Mentor	2	4	10	16
	Master	7	1	14	22
	Total	72	12	26	110

Table 9: Teacher Role for Movers, 2011-12 to 2012-13

		Teacher Role 2012-13			
		Career	Mentor	Master	Total
Teacher Role 2011-12	Career	127	11	4	142
	Mentor	4	6	24	34
	Master	2	4	9	15
	Total	133	21	37	191

SKR scores for movers increased from 2010-11 ($M = 3.37, SD = 0.63$) to 2011-12 ($M = 3.49, SD = 0.64$), $t(104) = 2.48, p = .02, d = 0.19$. Scores also increased for those teachers who switched schools from 2011-12 ($M = 3.22, SD = 0.53$) to 2012-13 ($M = 3.36, SD = 0.53$), $t(188) = 4.45, p = .00, d = 0.26$.

Classroom value-added scores increased for movers from 2010-11 ($M = 3.14, SD = 1.42$) to 2011-12 ($M = 3.24, SD = 1.14$), $t(20) = .20, p = .84, d = .08$. Additionally, classroom value-added scores increased from 2011-12 ($M = 3.27, SD = 1.14$) to 2012-13 ($M = 3.39, SD = 1.07$), $t(40) = .55, p = .59, d = 0.11$

TAP School Leavers

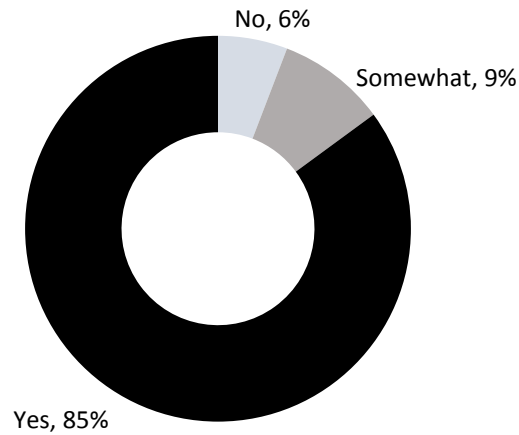
The 76 teachers who taught in TAP schools during the 2010-11 school year, but left prior to the 2011-12 school year came from 51 schools in 8 states. Forty-six of these teachers were career teachers, 12 were mentor teachers, and 18 were master teachers. Fifty-seven of these teachers had 2010-11 SKR scores, and the mean was 3.36 ($SD = 0.71$). Fifteen teachers had 2010-11 classroom value-added scores, and the mean was 3.80 ($SD = 1.47$).

The 192 teachers who taught in TAP schools during the 2011-12 school year, but left prior to the 2012-13 school year came from 107 schools in 9 states, with 131 career teachers, 24 mentor teachers, and 37 master teachers. For teachers with 2011-12 SKR scores ($n=174$), the mean was 3.26 ($SD = 0.63$). Forty three teachers had 2011-12 classroom value-added scores, and the mean was 3.05 ($SD = 1.15$).

Administrator Survey Results

Across the responses, the administrators reported high values for retaining and recruiting teachers into TAP schools. The overall mean of the retention construct was 3.97 ($SD = 0.65$), which indicates that on average, the administrators agree the TAP System is helping to recruit and retain teachers. Figure 2 illustrates the responses in a different way, showing the reported values for responses to one survey item – agreement with the implementation of TAP in retaining effective teachers. This item asks specifically about “effective teachers” rather than all teachers, and provides a further indication of the impact of the TAP System from the perspective of administrators.

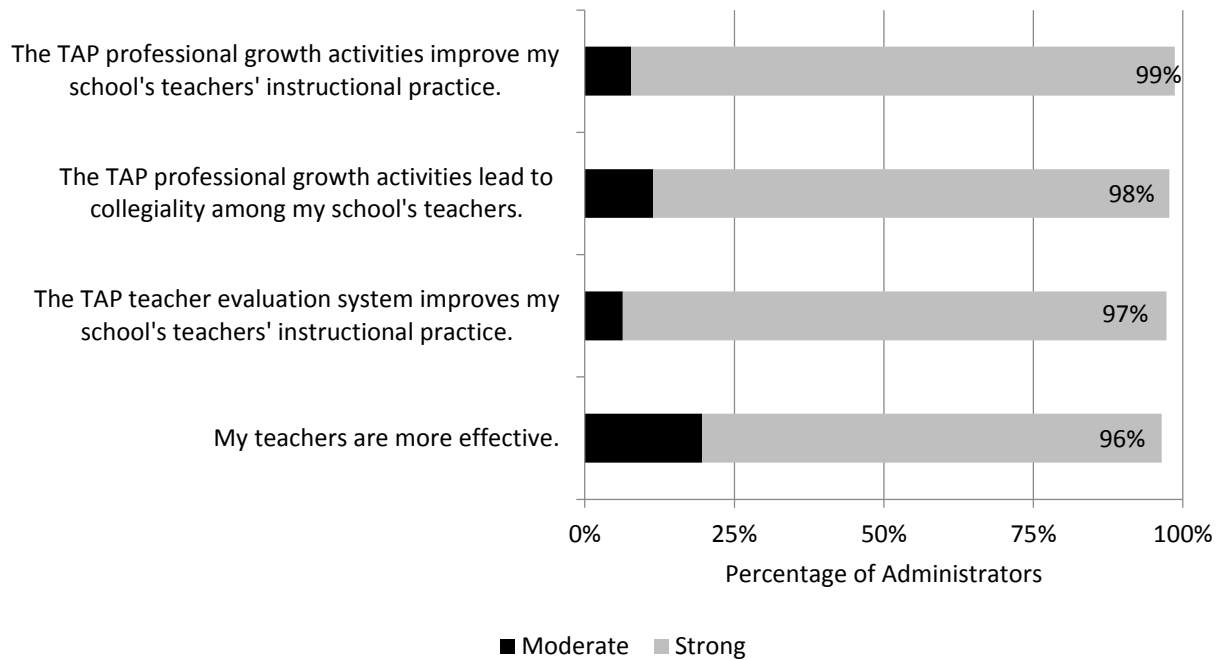
Figure 2: “The Implementation of TAP has helped retain effective teachers at my school.”



(n=480 administrators, 2013 NIET Administrator Survey)

To further explore the perspective of administrators, four additional survey items were reviewed as related to the impact of the TAP System on teachers and elements related to teacher retention. In particular, following the prior investigation related to instructional practices, the administrators were asked to report their perception of the TAP System’s impact on instructional practices. Two core elements of the TAP System are reported on in Figure 3, the impact of the professional growth activities and the impact of the evaluation system. Additionally, the administrators were asked about the overall influence of the TAP System on the collegiality levels in their schools and if the teachers were more effective. As an example of why the TAP System works, one principal explained, “*The TAP System is like graduate education should be – it is a hands-on, higher education quality experience that leads my teachers to being better at what they do, which is teach children.*”

Figure 3: Administrator Survey Results on TAP Outcomes in their Schools



The results to research questions 1-3 describe the patterns of movement and retention in TAP System schools as well as the perception of retention from administrators. The fourth and final research question aims to understand and estimate the impact of this retention beyond the prima facie value that increased retention is ostensibly beneficial.

To further explore the net effect of retaining teachers, and as demonstrated, more effective teachers, we examined the ongoing conversation about the costs of educator attrition for schools, teachers, students, and communities. Given the discrepancy in costs (ranging from \$5,000 to 200% of the departing teacher’s salary), a conservative estimate of teacher attrition may be defined at \$8,500 per teacher (see ACORN, 2004; Barnes, Crowe, & Schaefer, 2007; Simon & Johnson, 2013; Texas Center for Educational Research, 2000). Using a representative elementary school with 40 teachers and a 20% attrition rate, eight teachers would depart the typical school each year. In a TAP System representative elementary school with 40 teachers, two teachers (6% attrition) would depart each year. The difference between these two schools on a conservative cost estimate would be \$50,000 (8 teachers in non-TAP school minus 2 teachers in TAP school, loss of 6 teachers at \$8,500 per teacher cost of attrition). Using higher estimates of attrition and larger schools, one can quickly glean the impact of the TAP System retention rate on the overall budget of a school when examining solely the attrition aspect. Non-pecuniary costs (i.e. collegiality, morale, teacher satisfaction) would be expected to increase as a result of lower attrition as well.

Discussion and Implications

The teacher crisis in America’s educational system is more comprehensive than prior research

understood (Ingersoll, 2002; TNTP, 2012). Unquestionably, teachers are a key component in education (Rivkin, Hanushek, & Kain, 2005). They reach students every day while in their classrooms and impact those students each day of their lives. The most effective teachers can advance students more than one year's growth – effectively reversing the achievement gap (TNTP, 2012). Conversely, the least effective teachers can dramatically exacerbate achievement gaps and leave students continuously short of a year's growth, thereby essentially derailing their opportunity for success.

The process of recruiting, inducting, developing, and retaining teachers also presents real instructional, financial, and organizational costs in education (Simon & Johnson, 2013). This cost is higher in America's highest-need schools (Allensworth et al., 2009; Beteille, Kalogrides, & Loeb, 2011; Ingersoll, 2001, 2004; Ronfeldt, Loeb, & Wyckoff, 2013). Much research is dedicated to understanding why these teachers leave and pinpointing the exact cost of their departure to students and schools. Such investigations are important and contribute to our understanding of strategies for rectifying these problems. However, amid efforts to understand leavers, efforts should also be made to examine instances where systems are working to keep teachers, particularly the most effective teachers.

This paper examined the impact of the TAP System on teacher retention. Using a dataset of over 12,000 teachers across ten states, the results are consistent. The teachers in the TAP schools are retained at levels substantially and significantly higher than in schools nationally and in high-need schools, which are more similar to TAP schools, where approximately 95% of the students qualify as free and reduced-price lunch.

Beyond retaining more teachers, the teachers in the TAP System schools demonstrate growth in their instructional ability as measured by the gain in their SKR scores. More importantly, this growth in instructional ability is also occurring while student performance scores are demonstrating growth, as measured by the gain in the classroom value-added scores. The gain in scores is found for both TAP teachers who stay in their school as well as for teachers who move to another TAP school. This finding of the TAP boost for instruction and student achievement for those who transfer to another TAP school provides evidence that the TAP System, as a comprehensive educator effectiveness model, works effectively across sites and within sites.

To put these findings into perspective, across the eight comparisons – two groups, two outcome measures, two change years – TAP System schools resulted in higher mean scores in seven of the eight comparisons. In all four comparisons of teacher instructional ability, the TAP teachers demonstrated significant increases ($p < 0.05$). Further, in three of the four classroom value-added comparisons, the TAP System schools also showed increases. This result indicates the TAP teachers remaining in the TAP schools are becoming more effective each year.

To also understand the degree of impact in retaining teachers, beyond a 14% comparative advantage, the effect size calculations provide further insight. The average effect size across the comparisons is $d = 0.26$. This finding shows that the effect of the TAP System on retaining teachers is approximately equal to the effect size of reducing class sizes by one-third on student achievement (Coe, 2002). While these are different outcome measures, they provide some relativity to showcase how substantial the effect of the TAP System is on keeping teachers in schools.

Additionally, examining the principal responses further illustrates how the TAP System is working to

affect schools. As reflected by Figure 2 (agree and somewhat agree), 94% of the principals report the TAP System is positively impacting the retention rate of effective teachers – as stated by 19 of 20 principals. The attitudinal response from principals echoes the findings from the retention figures across states. Principals view the TAP System as improving their ability to recruit and retain effective teachers. Finally, the cost benefit of this improved retention in TAP Schools is beginning to be unpacked. At face value, the increased number of retained teachers alone assists schools and reduces unnecessary costs; however, as explored throughout this paper, this cost function can escalate rapidly. Regardless of the specific dollar amount, the value of improved retention in TAP System schools, and the findings demonstrating that those who are retained are more effective educators, signals that the TAP System schools are improving opportunities for students and saving schools valuable resources currently lost in recruiting new teachers.

As schools, districts, and states continue to consider ways to improve their educators and opportunities for students, the closing statement from “The Irreplaceables” report seems aptly placed – “using retention as the primary tool for school improvement could deliver substantial results at a low cost within just a few years” (TNTP, 2012, p. 34). The question staggering many practitioners and policymakers is how can retention be increased? Simon and Johnson (2013) close their review of retention research by stating “policymakers and practitioners possess many options for improving aspects of the school environment and, although more research can inform this work, much is already known about what matters to teachers as they decide whether or not to continue teaching in their schools.” (p. 40). Studies continue to provide answers on how to retain effective teachers; however, more research examining the impact of existing models with proven records of effectiveness for increasing teacher quality and student achievement is needed. This paper has provided one step towards answering that question by examining the influence of the TAP System and showcasing the positive impact across years, across schools, and across measures.

References

- Achinstein, B., Ogawa, R. T., Sexton, D., & Freitas, C. (2010). Retaining teachers of color: A pressing problem and a potential strategy for “hard-to-staff” schools. *Review of Educational Research, 80*(1), 71–107. doi:10.3102/0034654309355994
- Algiers Charter School Association. (2011). Annual report 2011. Retrieved from http://www.tapsystem.org/publications/algiers_charter_schools_association_annual_report_2011.pdf
- Allensworth, E., Ponisciak, S., & Mazzeo, C. (2009). The schools teachers leave: Teacher mobility in Chicago Public Schools. Chicago, IL: Consortium on Chicago School Research -University of Chicago.
- Alliance for Excellent Education. (2005). Teacher attrition: A costly loss to the nation and to the states. Washington, DC. Retrieved from <http://all4ed.org/wp-content/uploads/2007/06/TeacherAttrition.pdf>
- Association of Community Organizations for Reform Now [ACORN]. (2004). Where have all the teachers gone? The costs of teacher turnover in ACORN neighborhood schools in Chicago. Retrieved from www.acorn.org/index.php?id=315
- Balu, R., Beteille, T., & Loeb, S. (2010). Examining teacher turnover: The role of school leadership. *Politique Americaine, 15*, 55–79.
- Barnes, G., Crowe, E., & Schaefer, B. (2007). The cost of teacher turnover in five school districts: A pilot study. Washington, DC: National Commission on Teaching and America’s Future. Retrieved from <http://www.eric.ed.gov/PDFS/ED497176.pdf>
- Barnett, J. H., Rinthapol, N., & Hudgens, T. (2014). TAP Research Summary: Examining the Evidence and Impact of TAP: The System for Teacher and Student Achievement. Santa Monica, CA: National Institute for Excellence in Teaching.
- Beaudin, B. Q. (1993). Teachers who interrupt their careers: Characteristics of those who return to the classroom. *Educational Evaluation and Policy Analysis, 15*(1), 51–64.
- Beteille, T., Kalogrides, D., & Loeb, S. (2011). Effective schools: managing the recruitment, development, and retention of high-quality teachers. NBER Working Paper No. 17177. Cambridge, MA: National Bureau of Economic Research, Inc.
- Birkeland, S. E., & Curtis, R. (2006). Ensuring the support and development of new teachers in the Boston Public Schools: A proposal to improve teacher quality and retention. Boston: Boston Public Schools.
- Borman, G. D., & Dowling, N. (2008). Teacher attrition and retention: A meta-analytic and narrative review of the research. *Review of Educational Research, 78*, 367–409.

- Boyd, D. J., Grossman, P. L., Lankford, H., Loeb, S., & Wyckoff, J. H. (2009). Who leaves? Teacher attrition and student achievement. CALDER Working Paper No. 23. Washington, DC: National Center for Analysis of Longitudinal Data in Education. Retrieved from http://www.urban.org/UploadedPDF/1001270_teacher_attrition.pdf
- Boyd, D. J., Lankford, H., Loeb, S., & Wyckoff, J. H. (2005). Explaining the short careers of high-achieving teachers in schools with low-performing students. *American Economic Review Proceedings* 95(2): 166-171.
- Buck, B., & Coffelt, C. (2013). Leadership program good for all teachers: TAP leaders provide support for colleagues, create collaborative team. *Des Moines Register*. Retrieved from <http://altonaherald.desmoinesregister.com/article/20130814/OPINION01/308140015/lowa-View-Leadership-program-good-all-teachers>
- Bullock, K. M., & Scott, W. H. (1993). The shortage of teachers of mathematics, physics and technology: Can mature entrants fill the gap? *Research in Science and Technological Education*, 11(2), 127–139.
- Coe, R. (2002). It's the effect size, stupid. Paper presented at the British Educational Research Association annual conference. September 12-14, 2002. Retrieved from <http://www.cem.org/attachments/ebe/ESguide.pdf>
- Clotfelter, C. T., Ladd, H. F., & Vigdor, J. (2005). Who teaches whom? Race and the distribution of novice teachers. *Economics of Education Review*, 24(4), 377–392.
- Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2011). Teacher mobility, school segregation, and pay-based policies to level the playing field. *Education Finance and Policy*, 6(3), 399–438.
- Daley, G., & Kim, L. (2010). A teacher evaluation system that works (NIET Working Paper). Santa Monica, CA: National Institute for Excellence in Teaching. Retrieved from <http://www.tapsystem.org>
- Donaldson, M. (2012). The promise of older novices: Teach for America teachers' age of entry and subsequent retention in teaching and schools. *Teachers College Record*, 114(10), 1-37.
- Eckert, J. (2013). Increasing educator effectiveness: Lessons learned from Teacher Incentive Fund sites. National Institute for Excellence in Teaching. Retrieved from <http://www.niet.org/assets/increasing-educator-effectiveness-lessons-learned-from-teacher-incentive-fund-sites.pdf>
- Goldhaber, D., Gross, B., & Player, D. (2007) Are public schools really losing their best? Assessing the career transitions of teachers and their implications for the quality of the teacher workforce. CALDER Working Paper No. 12. Washington, DC: National Center for Analysis of Longitudinal Data in Education Research.

- Goldring, R., Taie, S., & Riddles, M. (2014). *Teacher Attrition and Mobility: Results from the 2012-13 Teacher Follow-up Survey* (NCES 2014-077). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubs2014/2014077.pdf>
- Grissom, J. A. (2011). Can good principals keep teachers in disadvantaged schools? Linking principal effectiveness to teacher satisfaction and turnover in hard-to-staff environments. *Teachers College Record*, 113(11), 2552–2585.
- Guarino, C. M., Santibanez, L., & Daley, G. A. (2006). Teacher recruitment and retention: A review of the recent empirical literature. *Review of Educational Research*, 76(2), 173–208.
- Guin, K. (2004). Chronic teacher turnover in urban elementary schools. *Education Policy Analysis Archives*, 12(42), 1–30.
- Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2004). Why public schools lose teachers. *Journal of Human Resources*, 39(2), 326–354.
- Hanushek, E. A., Kain, J. F., O'Brien, D. M., & Rivkin, S. G. (2005). The market for teacher quality. NBER Working Paper No. 11154. Cambridge, MA: National Bureau of Economic Research, Inc.
- Hanushek, E. A., & Rivkin, S. G. (2010). Constrained job matching: Does teacher job search harm disadvantaged urban schools? NBER Working Paper No. 15816. Cambridge, MA: National Bureau of Economic Research, Inc.
- Headden, S. (2014). *Beginners in the classroom. What the changing demographics of teaching mean for schools, students, and society*. Stanford, CA: Carnegie Foundation for the Advancement of Teaching.
- Hemphill, C., & Nauer, K. (2009). *The new marketplace: How small-school reforms and school choice have reshaped New York City's high schools*. New York: Center for New York City Affairs, The New School for Management and Urban Policy. Retrieved from http://www.newschool.edu/milano/nycaffairs/documents/TheNewMarketplace_Report.pdf
- Hudson, S. (2010). The effects of performance-based teacher pay on student achievement. Discussion Paper for the Stanford Institute for Economic Policy Research, Stanford University. Retrieved from: http://www.stanford.edu/group/siepr/cgi-bin/siepr/?q=system/files/shared/pubs/papers/09023_Paper_Hudson.pdf
- Ingersoll, R. M. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal*, 38(3), 499–534.
- Ingersoll, R.M. (2002). The teacher shortage: A case of wrong diagnosis and wrong prescription. *Bulletin*, 86:631.

- Ingersoll, R.M. (2003). Is there really a teacher shortage? Philadelphia PA: University of Pennsylvania, Consortium for Policy Research in Education. Retrieved from <https://depts.washington.edu/ctpmail/PDFs/Shortage-RI-09-2003.pdf>
- Ingersoll, R. M. (2004). Why do high-poverty schools have difficulty staffing their classrooms with qualified teachers? Washington, DC: Center for American Progress and the Institute for America's Future. Retrieved from <http://www.americanprogress.org/kf/ingersoll-final.pdf>
- Ingersoll, R. M., & Merrill, L. (2010). Who's teaching our children. *Educational Leadership*, 67(8), 14-20.
- Ingersoll, R. M., & Merrill, L. (2012). Seven trends: The transformation of the teaching force. The Consortium for Policy Research in Education.
- Ingersoll, R. M., & Smith, T. M. (2003). The wrong solution to the teacher shortage. *Educational Leadership*, 60(8), 30-33. Retrieved from http://www.gse.upenn.edu/pdf/rmi/EL_TheWrongSolution_to_theTeacherShortage.pdf
- Jerald, C. D., & Van Hook, K. (2011). More than measurement: The TAP System's lessons learned for designing better teacher evaluation systems. Santa Monica, CA: National Institute for Excellence in Teaching. Retrieved from http://www.tapsystem.org/publications/eval_lessons.pdf
- Johnson, S. M. (2004). *Finders and keepers: Helping new teachers survive and thrive in our schools*. San Francisco, CA: Jossey-Bass.
- Johnson, S. M., & Birkeland, S. E. (2003). Pursuing a "sense of success": New teachers explain their career decisions. *American Educational Research Journal*, 40(3), 581-617.
- Johnson, S. M., Berg, J. H., & Donaldson, M. L. (2005). Who stays in teaching and why: A review of the literature on teacher retention. The project on the next generation of teachers. Cambridge, MA: Harvard Graduate School of Education. Retrieved from http://isites.harvard.edu/icb/icb.do?keyword=hgse_pngt
- Johnson, S. M., Kraft, M., & Papay, J. P. (2012). How context matters in high-need schools: The effects of teachers' working conditions on their professional satisfaction and their students' achievement. *Teachers College Record*, 114(10), 1-39.
- Kaiser, A. & Cross, F. (2011). Beginning Teacher Attrition and Mobility: Results from the first through third waves of the 2007-08 beginning teacher longitudinal survey. U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubs2011/2011318.pdf>
- Keigher, A. (2010). *Teacher Attrition and Mobility: Results from the 2008-09 Teacher Follow-up Survey (NCES 2010-353)*. U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010353>

- Luekens, M. T., Lyter, D. M., Fox, E. E., & Chandler, K. (2004). Teacher attrition and mobility: Results from the Teacher Follow-Up Survey, 2000-01. Washington, DC.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 140, 5-55.
- Liu, E., Rosenstein, J. G., Swan, A. E., & Khalil, D. (2008). When districts encounter teacher shortages: The challenges of recruiting and retaining mathematics teachers in urban districts. *Leadership & Policy in Schools*, 7(3), 296–323. doi:10.1080/15700760701822140
- Loeb, S., Darling-Hammond, L., & Luczak, J. (2005). How teaching conditions predict teacher turnover in California schools. *Peabody Journal of Education*, 80(3), 44–70. doi:10.1207/s15327930pje8003_4
- Mann, D., Leutscher, T., & Reardon, R. M. (2013). The system for teacher and student advancement: An evaluation of achievement and engagement in Louisiana. Santa Monica, CA: National Institute for Excellence in Teaching. Retrieved from <http://www.niet.org/assets/PDFs/interactive-louisiana-student-achievement.pdf>
- Marinell, W. H., & Coca, V. M. (2013). Who stays and who leaves? Findings from a three part study of teacher turnover in NYC middle schools. New York, NY: The Research Alliance for NYC Schools.
- Milanowski, A. T., & Odden, A. R. (2007). A new approach to the cost of teacher turnover. Washington, DC: School Finance Redesign Project, Center on Reinventing Public Education.
- National Commission on Teaching and America's Future. (2007). The high cost of teacher turnover. Washington, DC: NCTAF Policy Brief. Retrieved from <http://nctaf.org/research/>
- Neild, R. C., Useem, E., Travers, E. F., & Lesnick, J. (2003). Once and for all: Placing a highly qualified teacher in every Philadelphia classroom. Philadelphia, PA: Research for Action. Retrieved from <http://www.researchforaction.org/publication-listing/2/?id=145>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Papay, J. P., & Johnson, S. M. (2011). Is PAR a good investment? Understanding the costs and benefits of teacher Peer Assistance and Review programs. *Educational Policy*, 26(5), 696–729. doi:10.1177/0895904811417584
- Peske, H., & Haycock, K. (2006). Teaching inequality: How poor and minority students are shortchanged on teacher quality. Washington, DC: The Education Trust.
- Planty, M., Hussar, W., Snyder, T., Provasnik, S., Kena, G., Dinkes, R., et al. (2008). The condition of education 2008 (NCES 2008-031). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubs2008/2008031.pdf>
- Podgursky, M., Monroe, R., & Watson, D. (2004). The academic quality of public school teachers: An analysis of entry and exit behavior. *Economics of Education Review*, 23(5): 507- 518.

- Rivkin, S., Hanushek, E. A. & Kain, J. (2005) Teachers, schools, and academic achievement. *Econometrica*, 73(2), 417-458.
- Rockoff, J. (2004). The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review*, 94, 247–252.
- Ronfeldt, M., Loeb, S., & Wyckoff. (2013). How teacher turnover harms student achievement. *American Educational Research Journal*, 50(1), 4-36.
- Schacter, J., Thum, Y. M., Reifsnieder, D., & Schiff, T. (2004). The Teacher Advancement Program report two: Year three results from Arizona and year one results from South Carolina TAP schools. Santa Monica, CA: Milken Family Foundation. Retrieved from http://www.tapsystem.org/pubs/tap_results_azsc2004.pdf
- Schacter, J., & Thum, Y. M. (2005). TAPping into high quality teachers: Preliminary results from the Teacher Advancement Program comprehensive school reform. *School Effectiveness & School Improvement*, 16(3), 327–353.
- Shen, J. (1997). Teacher retention and attrition in public schools: Evidence from SASS91. *Journal of Educational Research*, 91(2), 81–88.
- Shockley, R., Guglielmino, P., & Watlington, E. J. (2006). A national crisis in teacher education: What are the costs? Retrieved from http://www.pearsonassessments.com/hai/images/NES_Publications/2006_11ShockleyGuglielminoWatlington_558_1.pdf
- Simon, N. S., & Moore Johnson, S. (2013). Teacher turnover in high-poverty schools: What we know and can do. Working Paper: Project on the Next Generation of Teachers. Cambridge, MA: Harvard Graduate School of Education.
- Solmon, L. C., White, J. T., Cohen. D., & Woo, D. (2007). The effectiveness of the teacher advancement program. Santa Monica, CA: National Institute for Excellence in Teaching. Retrieved from http://www.tapsystem.org/pubs/effective_tap07_full.pdf
- Staiger, D. O. & Rockoff, J. E. (2010). Searching for effective teachers with imperfect information. *Journal of Economic Perspectives*, 24(3), 97-118.
- Stuit, D.A., & Smith, T.M. (2010). *Teacher turnover in charter schools*. Nashville: National Center on School Choice. Retrieved from http://www.vanderbilt.edu/schoolchoice/documents/stuit_smith_ncspe.pdf
- Texas Center for Educational Research. (2000). The cost of teacher turnover. Austin: Texas State Board for Educator Certification.
- TNTP (The New Teachers Project). (2012). The Irreplaceables: Understanding the real retention crisis in America’s urban schools. Retrieved from http://tntp.org/assets/documents/TNTP_Irreplaceables_2012.pdf

Weiss, E. M. (1999). Perceived workplace conditions and first-year teachers' morale, career choice commitment, and planned retention: a secondary analysis. *Teaching and Teacher Education*, 15(8), 861–879.