Principal Learning Opportunities and School Outcomes

Evidence From California

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LEARNING POLICY INSTITUTE

Wallace

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Executive Summary

A growing body of research points to the substantial influence of principals on school conditions and students' learning. But how can principals learn to be good leaders? And are there professional learning strategies that make a difference in principal effectiveness? This study, which is part of a larger project synthesizing the research on principal learning, provides some new insight into these questions.

Relatively few studies have successfully linked specific features of principal learning—in either preservice preparation or in-service professional development—to teacher and student outcomes. Further, most studies of principal professional learning have examined the *efficacy of particular programs* rather than the *mix of program features and experiences* to which principals have had access. To begin to address this gap in the literature, we conducted a study of the relationship between principals' learning opportunities (both preservice preparation and in-service professional development) and key outcomes for the teachers and students in their schools. We examined both teacher retention and student achievement gains in English language arts and mathematics. This study offers a new perspective on the efficacy of professional learning by using detailed data from a large, representative sample of principals directly linked to individual-level information from the teachers and students in their schools.

Data and Methods

To investigate the relationship between the quality of principal preparation and professional development and teacher and student outcomes, we used regression analyses that account for principal, school, and district characteristics as well as student and teacher characteristics.

We gleaned principals' professional learning experiences from a representative survey of California elementary and middle school principals designed by the Learning Policy Institute and administered by the American Institutes for Research in 2017. We linked principals' surveys to state administrative data files containing data on teacher, student, and school characteristics and outcome data from the California Department of Education. Our full samples included approximately 460 schools and principals, 14,000 teachers, and 314,000 students.

For the preparation analysis, we limited the sample to principals with 5 years of experience or less because principals would be expected to rely on their preparation in their first years on the job, after which their own experience would likely play a greater role. The professional development sample included all principals who reported participating in professional development within the prior 2 years.

To create measures of professional learning for use in our analyses, we conducted factor analyses and created an index of quality preparation and an index of access to professional development.

The index of quality principal preparation included measures of the extent to which the preparation experience offered:

- a quality internship;
- opportunities for applied learning;
- learning about leading instruction;
- learning about shaping a positive school climate;
- learning about developing people; and
- learning about meeting the needs of diverse learners.

The index of access to principal professional development included measures of the extent to which principals have experienced:

- frequent professional development;
- learning about managing change;
- learning about leading instruction;
- learning about shaping a positive school climate;
- learning about developing people; and
- learning about meeting the needs of diverse learners.

Results of Principal Preparation and Professional Development

Both preservice preparation and in-service professional development appear to enhance principals' abilities to effect positive changes in schools that are associated with stronger teacher retention and student academic outcomes.

Principals' overall preparation quality and all the components of preparation considered in the analyses are positively related to teacher retention. These relationships are statistically significant for overall preparation quality as well as for learning about developing people and meeting the needs of diverse learners.

In addition, principals' participation in higher-quality internships during their preparation is associated with significantly greater student learning gains in English language arts. Higher-quality internships align field experience with theory or coursework and offer candidates the opportunity to lead, facilitate, and make decisions typical of an educational leader, developing their perspectives on school improvement with the support of a mentor.

In terms of principals' professional development, the overall index of access, as well as each of the components of professional development, is positively related to teacher retention, though none of the relationships reach a level of statistical significance. The associations between principal professional development access and student achievement are quite strong and consistent. The overall professional development access index and each component of professional development are positively related to student gains in both English language arts and mathematics. The strength of the associations is strongest in mathematics, for which every area of professional development shows a significant relationship.

Not surprisingly, principals' professional development experiences associated with learning about leading instruction show a strong relationship to student gains in both English language arts and mathematics, and the relationship is at least marginally significant in both subjects for learning about shaping a positive school climate and meeting the needs of diverse learners. These relationships are strongest for historically underserved students of color, suggesting that professional development programs, especially those focused on learning about leading instruction, may help principals develop specific means to support teaching and learning for those furthest from opportunity.

Finally, the student gains in English language arts and mathematics that are associated with greater access to professional development are particularly large for students in the schools of novice principals, suggesting that principal professional development can help early-career principals more quickly reach the effectiveness levels of their more experienced peers.

While the relationships observed in the study do not prove a causal relationship, they offer promising evidence that principals' engagement in high-quality preservice and in-service learning opportunities is positively related to the stability of the teaching force and the academic achievement of students.

Introduction

A growing body of research points to the substantial influence of principals on school conditions and students' learning. In a recent review of this evidence, Jason Grissom and colleagues conclude that, given the size of this influence and its pervasive reach, "It is difficult to envision an investment with a higher ceiling on its potential return than a successful effort to improve principal leadership."[1]

The literature now also identifies a set of principal behaviors found to be associated with both teacher outcomes (practices, satisfaction, and retention) and student outcomes (achievement, progress through school, and graduation). These include:

- **Setting direction:** Helping the school community develop a shared sense of purpose and vision that can motivate action.
- **Leading instruction:** Supporting a thoughtful, coherent curriculum focus, and engaging in instructionally focused work with teachers.
- **Shaping a positive school climate:** Creating a positive environment for all learners and supporting their social, emotional, and academic development.
- **Developing people:** Recruiting, retaining, and developing staff; facilitating collaboration and shared decision-making.
- **Managing change:** Using data and engaging people to spur continuous improvement.[2]

How can principals learn to do these things well? Are there professional learning strategies that make a difference in principal effectiveness? These questions motivate this study, which is part of a larger project synthesizing the research on principal learning.

In a companion report, our team synthesizes a large body of research that illuminates many of the important elements of high-quality learning experiences associated with principal preparedness, practices, and effectiveness. These include content focused on instructional leadership, organizational development, and managing change, coupled with opportunities for applied learning in collaborative settings, supported by mentoring and coaching.[3]

Relatively few studies have successfully linked specific features of principal learning—in either preservice preparation or in-service professional development—to teacher and student outcomes. Further, most studies of principal professional learning have examined the *efficacy of particular programs* rather than the *mix of program features and experiences* to which principals have had access. In most cases, studies have been unable to control for many of the variables that create different school contexts that also influence the outcomes of interest. Also, sample sizes have been small, limiting both statistical power and generalizations that can be drawn from such research.

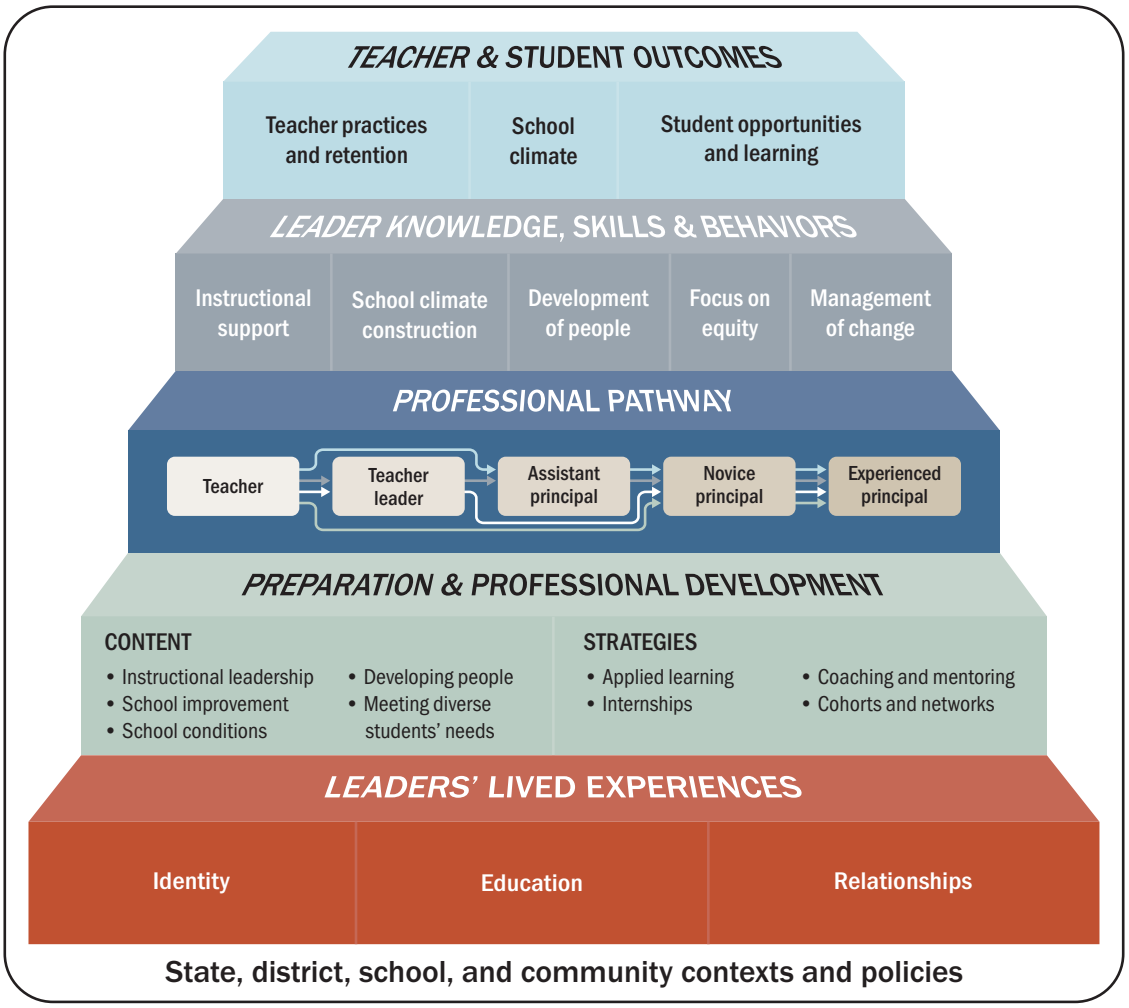
To begin to address this gap in the literature, we conducted a study of the relationship between principals' learning opportunities (both preservice preparation and in-service professional development) and key outcomes for the teachers and students in their schools in California. We examined both teacher retention and student achievement gains in English language arts and mathematics.

This study offers a new perspective on the efficacy of professional learning by using detailed data about principals' preparation and professional development from a large, representative sample of principals directly linked to individual-level data from the teachers and students in their schools. These data provide both extensive information on each principal's characteristics and experiences and allow us to control for other relevant characteristics of the teachers, students, and schools.

Professional Learning Theory of Action

Our study is informed by a theory of action that assumes connections between principal professional learning—both the content of learning and strategies for learning—and principal enactment of specific leadership behaviors. Principals' life experiences and professional career pathways contribute to their knowledge, skills, and dispositions as well. The resulting behaviors, in turn, are related to teacher practices and retention, school climate, and student opportunities and learning. (See Figure 1.) These elements unfold in distinctive ways within specific state, district, and school contexts and policies, as demonstrated by a recent synthesis of evidence examining the specific skills and behaviors associated with principal effectiveness.[4]

Figure 1
Professional Learning Theory of Action



Source: Learning Policy Institute. (2022).

Many of the other factors that influence principals' knowledge, skills, and behaviors—as well as the teacher and student outcomes we examined—are taken into account in our analyses, thus allowing us to more fully test our theory of action.[5] For example, we are able to control for principals' prior teaching experience, years in the principalship, and race/ethnicity, which support their knowledge, skills, and behaviors. Similarly, as we look at teacher retention, we can control for individual teachers' age and experience in teaching, which influence attrition rates, as well as gender, race/ethnicity, and teaching field. As we look at student achievement gains, we can control for students' prior achievement, demographics (including income level, English learner status, and special education status), and district resource levels, which operate alongside principals' knowledge, skills, and practices to shape learning opportunities.

Data Sources and Methods

We briefly summarize our data sources and research methods below and provide more information in Appendix A.

Data Sources

We gleaned principals' professional learning experiences from a representative survey of California elementary and middle school principals designed by the Learning Policy Institute and administered by the American Institutes for Research in 2017.[6] The California Principal Survey results describe and quantify principals' access to, and engagement with, key aspects of their preparation and professional learning that prior research has found to be associated with high-quality programs. These include covering topics that address instructional leadership, school climate, developing people, managing change, and meeting the needs of diverse learners, as well as using learning strategies that involve collaboration in cohorts or networks; engaging in applied learning experiences; and experiencing internships, mentoring, or coaching. The survey items are listed in Tables A1 and A2 in the appendix.

We were able to link principals' surveys to state administrative data files containing data on teacher, student, and school characteristics and outcome data from the California Department of Education. Our full samples included approximately 460 schools and principals, 14,000 teachers, and 314,000 students.

Measures of Preparation and Professional Development Quality and Access

To create measures of high-quality professional learning for use in our analyses, we conducted a factor analysis to identify groups of survey items that represent key aspects of principal learning. This analysis resulted in overall and component measures for preparation quality and professional development access. (See Table 1.) Based on the factor analysis, we developed an index factor and six component factors from 22 survey items that indicated quality preparation. Similarly, we developed an index factor and six component factors from 18 survey items that indicated access to professional development. (See Appendix A for a description of the survey items comprising each factor.)

For each measure of preparation quality, we scaled factor scores so that they ranged from 1 (low quality) to 10 (high quality) based on survey responses and the weighting of each variable. For the measure of overall access to professional development, we similarly scaled factor scores so that they ranged from 1 (low access) to 10 (high access), based on survey responses and variable weightings.

Table 1
Measures of Professional Preparation Quality and Professional Development Access

Measures of Preparation Quality	Measures of Professional Development Access
• Index of overall preparation quality • Component measures ◦ A quality internship ◦ Opportunities for applied learning ◦ Learning about leading instruction ◦ Learning about shaping a positive school climate ◦ Learning about developing people ◦ Learning about meeting the needs of diverse learners	• Index of overall professional development access • Component measures ◦ Professional development frequency ◦ Learning about managing change ◦ Learning about leading instruction ◦ Learning about shaping a positive school climate ◦ Learning about developing people ◦ Learning about meeting the needs of diverse learners

Source: Learning Policy Institute. (2022).

Analytic Approaches

To investigate the relationship between the quality of principals' preparation and professional development and teacher and student outcomes, we used regression analysis. This technique allowed us to predict mean teacher and student outcomes given principals' specific engagement in preparation or professional development. These models account for principal, school, and district characteristics as well as student and teacher characteristics.

For the preparation analyses, we limited our sample to those principals who were early in their careers (5 years of experience or less). Principals would be expected to rely on their preparation in their first years on the job, after which their own experience would likely play a greater role. Since we restricted the preparation analysis to early-career principals, the samples included approximately 200 principals, 6,000 teachers, and 59,000 students. The smaller sample reduced the statistical power, making it less likely that all practically important findings would reach statistical significance. The professional development sample included all principals who reported participating in professional development within the prior 2 years.

To address our research questions, we used two types of regression analyses:

1. To model teacher retention, we used logistic regression to estimate the odds that a teacher would stay at their school for an additional year. These analyses of retention used individual teacher records, so they took into account the other teacher traits (such as years of experience) that might otherwise influence retention rates. We also took into account that teachers are nested within schools.

2. To model student achievement gains, we used linear regression to predict student test scores (scale scores on the California Assessment of Student Performance and Progress) in a particular year, controlling for their test scores in the immediate prior year, along

with other student and school characteristics. Student achievement gains were modeled separately for English language arts and mathematics. We also took into account that test scores for a particular student are not independent of one another and that students are nested within schools. (See details in Appendix A.)

Findings

Principal Learning and Teacher Retention

In this section, we present the findings of our analyses related to the relationship between teacher retention and principal preservice preparation and in-service learning opportunities.

Principal preservice preparation

Principals' overall preparation quality and all the components of preparation considered in our analysis are positively related to teacher retention; that is, the odds that a teacher will still be in the same school the following year. An odds ratio greater than 1 means that the teacher is more likely to stay. These relationships are statistically significant for overall preparation quality as well as for preparation in developing people and meeting the needs of diverse learners. (See Table 2.)

In schools in which principals reported that they had received high-quality preparation, teachers' likelihoods of staying in the school were significantly higher, controlling for other teacher traits and school conditions. To illustrate this relationship, we forecast teacher retention outcomes using our statistical model. We can consider two teachers: one whose principal had low-quality preparation (which we define as a preparation index score of 2) and another whose principal had high-quality preparation (which we define as a preparation index score of 9).[7] As shown in Figure 2, our model projects that a teacher in a school served by the principal with low-quality preparation would have a 78% probability of staying through the following year, while a teacher in a school served by the principal with high-quality preparation would have an 89% probability of staying through the following year, holding all other variables constant.

Table 2
Relationship Between Principal Preparation and Teacher Retention (Odds Ratio)

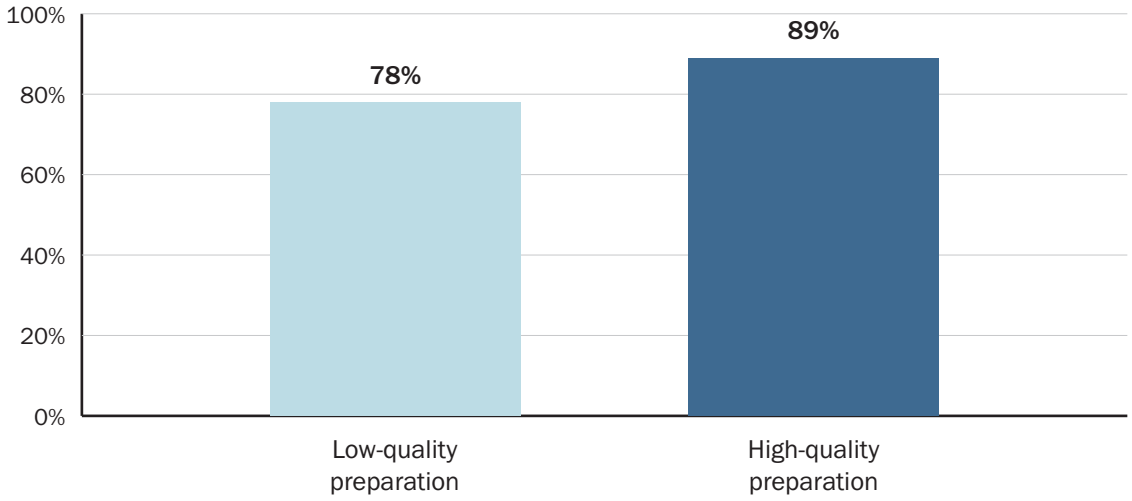
Outcome	Overall Preparation Quality	Quality Internship	Applied Learning	Leading Instruction	Shaping a Positive School Climate	Developing People	Meeting Needs of Diverse Learners
Teacher Retention	**1.130***	1.022	1.071	1.068	1.086	**1.148***	**1.111***

Note: ~ is $p<0.10$; * is $p<0.05$; ** is $p<0.01$; *** is $p<0.001$.

The results shown in the table represent the odds that the average teacher will remain in school the following year compared to the odds that they will leave, dependent upon the preparation of the school's principal and controlling for teacher, school, and district characteristics, including district size and spending. An odds ratio greater than 1 indicates an increased likelihood of the teacher remaining in school.

Source: Learning Policy Institute. (2022).

Figure 2
Predicted Probability of Teacher Retention for Differently Prepared Principals



Source: Learning Policy Institute. (2022).

Two components of preparation are also found to play an important role in teacher retention. We find that schools led by principals who reported they had received high-quality preparation in *developing people* have much higher teacher retention, as do those whose principals reported high-quality preparation in *meeting the needs of diverse learners*. Because some district conditions can influence teacher retention, we include key district-level control variables, such as district per-pupil expenditure, district size, and the student–administrator ratio.[8]

It makes sense that these areas of preparation would enhance a principal's ability to retain teachers. Preparation in *developing people* includes learning how to recruit and retain teachers, design professional learning opportunities, support improvement, and invest resources to enable schoolwide improvements and manage the school efficiently. Preparation in *meeting the needs of diverse learners* prepares a principal to help teachers equitably meet the needs of English learners, students with disabilities, and other students—something that enhances teachers' sense of efficacy, which, in turn, supports their satisfaction and retention.

In-service professional development

The overall extent of principals' professional development, as well as all the components of professional development, also appear to be positively related to teacher retention; that is, the odds that a teacher will still be teaching in the same school the following year. However, none of the relationships reaches a level of statistical significance. (See Table 3.)

Table 3
Relationship Between Professional Development Factors and Teacher Retention (Odds Ratio)

Outcome	Overall Professional Development Index	Professional Development Frequency	Managing Change	Leading Instruction	Shaping a Positive School Climate	Developing People	Meeting Needs of Diverse Learners
Teacher Retention	1.02	1.03	0.99	1.01	1.00	1.02	1.04

Note: ~ is $p<0.10$; * is $p<0.05$; ** is $p<0.01$; *** is $p<0.001$.

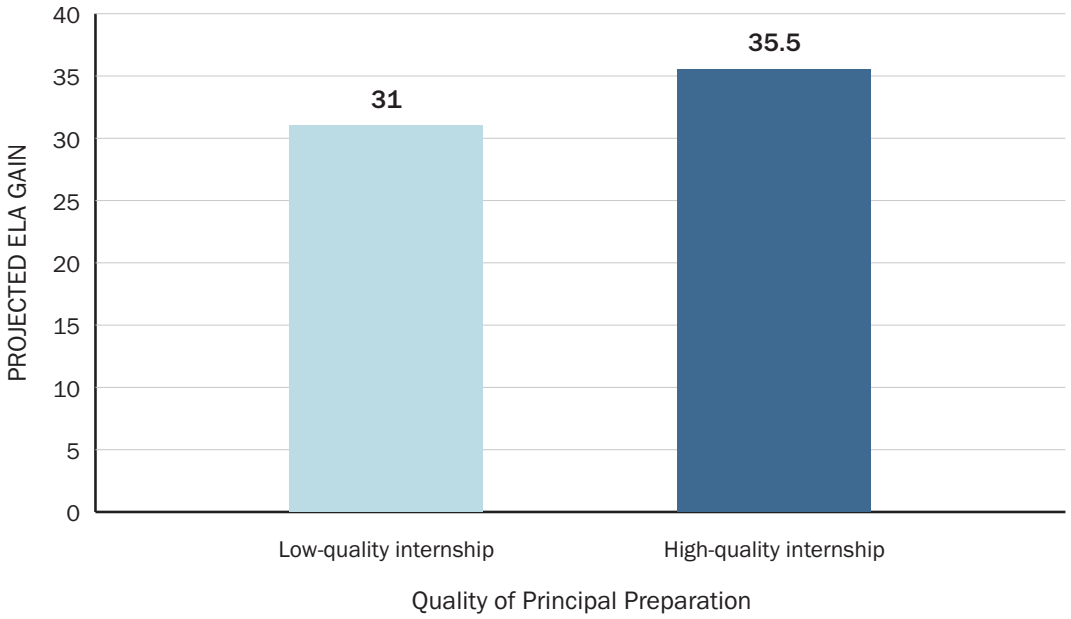
Source: Learning Policy Institute. (2022).

Principal Learning and Student Achievement

With respect to student achievement gains, principals' experiences with higher-quality internships during their preparation are associated with significantly greater student learning gains in English language arts ($p<0.046$). Higher-quality internships feature a tight alignment between the field experience and theory or coursework and offer candidates the opportunity to lead, facilitate, and make decisions typical of an educational leader, developing a leader's perspective on school improvement with the support of a mentor. Other research finds that this kind of internship experience is one of the most important elements of high-quality preparation programs.[9]

To illustrate this relationship, Figure 3 shows the differential in the forecasted achievement gains of two students at the mean: one whose principal had a low-quality clinical preparation experience (which we define as a quality internship score of 2) and another whose principal had high-quality clinical preparation experience (which we define as a quality internship score of 9). The difference in their scale score gains from year 1 to year 2 (31 and 35.5, respectively) is equivalent to 0.08 *SD*[10] and can be interpreted as an additional month of instruction.[11]

Figure 3
Projected Student Achievement Gains in English Language Arts (ELA), Based on Principal Internship Quality



Source: Learning Policy Institute. (2022).

The associations between principal *professional development access* and student achievement are quite strong and consistent. Table 4 shows that the overall professional development access index and each component of professional development are positively related to student gains in both English language arts and mathematics. The overall index includes both the frequency of professional development and the degree to which it attends to the core constructs of managing change, leading instruction, shaping a positive school climate, developing people, and meeting the needs of diverse learners.

The strength of the associations is strongest in mathematics, for which every area of professional development shows at least a marginally significant relationship. Not surprisingly, principals' professional development experiences associated with leading instruction show a very strong relationship to student gains in both English language arts and mathematics, and the relationship is at least marginally significant in both subjects for *shaping a positive school climate* and *meeting the needs of diverse learners*.

Professional development focused on leading instruction helps principals learn to implement state standards, select effective curriculum strategies and materials, develop students' higher-order thinking skills, and raise student achievement. Professional development focused on shaping a positive school climate emphasizes how to lead schools that support students from diverse backgrounds, attend to social and emotional development and mental health as well as academic learning, and use restorative practices instead of exclusionary discipline—all practices that have been shown to boost school safety and student engagement as well as academic achievement.

Table 4
Relationship Between Professional Development Factors and Student Achievement Gains

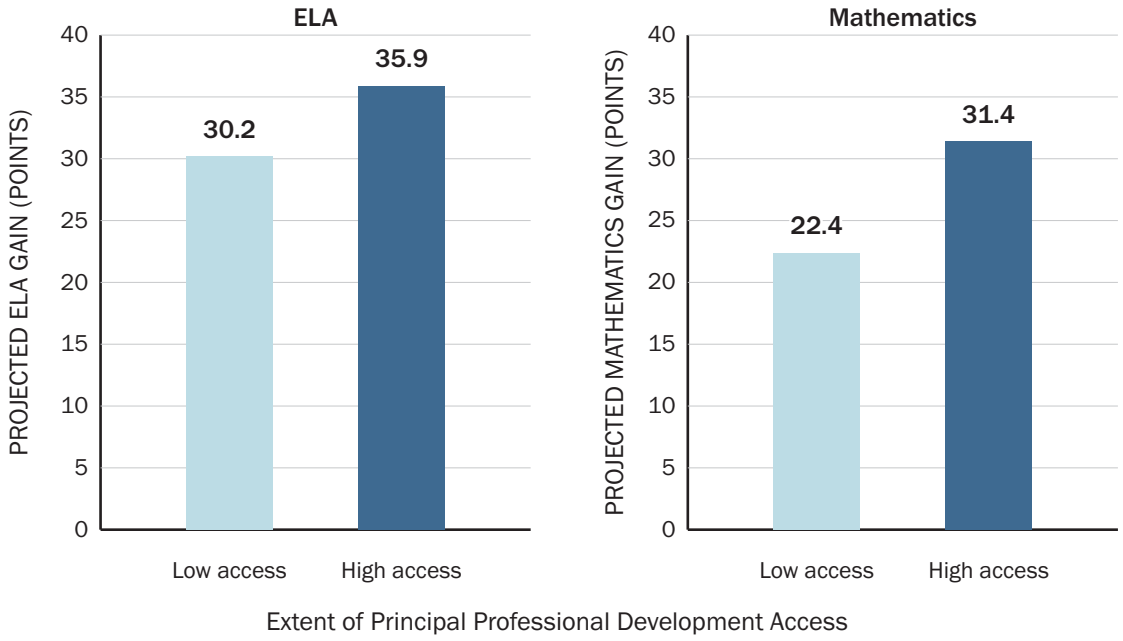
Outcome	Overall Professional Development Index	Professional Development Frequency	Managing Change	Leading Instruction	Shaping a Positive School Climate	Developing People	Meeting Needs of Diverse Learners
ELA	**0.817***	0.541	0.476	**0.869***	**0.615~**	0.426	**0.561~**
Mathematics	**1.281****	**0.966****	**1.282*****	**1.176****	**0.639~**	**1.129****	**0.997****

Note: ~ is $p<0.10$; * is $p<0.05$; ** is $p<0.01$; *** is $p<0.001$.

Source: Learning Policy Institute. (2022).

To illustrate the strength of the relationship between principals' access to professional development and student achievement, we can consider two students initially scoring at the mean on the achievement tests: one whose principal had little access to professional development in these areas (a score of 2 out of 10 on the index) and another whose principal had extensive access (a score of 9 out of 10 on the index). As shown in Figure 4, the forecasted difference in gains for these two students, holding student, principal, school, and district characteristics constant at their sample means, is 5.7 scale points in English language arts, equivalent to 0.10 *SD,* which can be interpreted as an additional month and a half (29 days) of instruction. In mathematics, the 9-point difference in gains is equivalent to 0.17 *SD,* which can be interpreted as almost 3 months (55 days) of additional instruction.[12]

Figure 4
Projected Gains in English Language Arts (ELA) and Mathematics, Based on Principal Professional Development Access



Source: Learning Policy Institute. (2022).

Does Professional Development Matter More for Some Principals and Students?

While the literature suggests that principals may benefit differently from professional development at different points in their careers and in different aspects of leadership, studies have not yet addressed how these differences may be reflected in a desired outcome of principals' professional learning—improved student achievement. We examined how the benefits of professional development, as measured by student achievement gains, might vary for early-career and veteran principals and how impacts on different aspects of leadership might differently affect groups of students in principals' schools.

Principal Professional Development and Principal Experience

We examined the relative influence of professional development overall and of each of the components for principals at different stages in their careers: those with 3 or fewer years of experience (early-career), those with 4 to 9 years of experience (mid-career), and those with 10 or more years of experience (veteran).

Early-career principals appear to obtain greater benefits from more extensive professional development overall and from a greater frequency of professional development, as well as from specific components of professional development. The greater benefits for early-career principals are statistically significant for professional development associated with managing change, leading instruction, and developing people. In particular, higher-frequency professional development and professional development in managing change appear to matter far more for early-career principals than for veteran principals who have the benefit of years of experience to rely on. (See Table 5.) These differentials by principal experience level do not appear when the outcome is student gains in English language arts.

Table 5
Relationship Between Professional Development Components and Student Achievement in Mathematics, Relative to Principal Experience

Principal Experience Group	Overall Professional Development Access	Professional Development Frequency	Managing Change	Leading Instruction	Shaping a Positive School Climate	Developing People	Meeting Needs of Diverse Learners
Main Effect for Principals With 3 or Fewer Years of Experience	2.186*	2.207***	2.685***	1.699*	0.807	1.8**	1.586~
3 or Fewer Years of Experience	(Reference)						
4–9 Years of Experience	-1.631	-1.716*	-2.048*	-1.024	-0.297	-1.418	-1.231
10+ Years of Experience	-0.821	-2.163*	-1.79*	-0.39	-0.166	-0.462	-0.397

Notes: ~ is $p<0.10$; * is $p<0.05$; ** is $p<0.01$; *** is $p<0.001$.

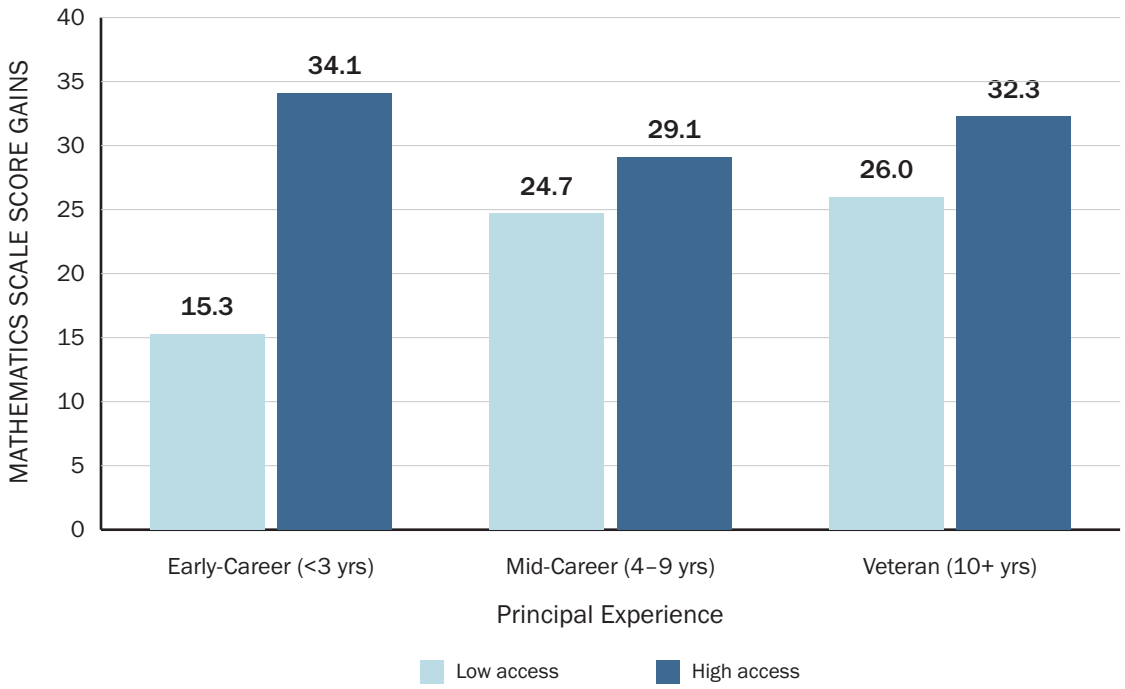
The positive "main effect" regression coefficients presented indicate that as the strength of the professional development factor increases for principals with 3 or fewer years of experience, so does the mean student achievement in mathematics. The value of the "4–9 Years of Experience" and of the "10+ Years of Experience" regression coefficients indicates the relative difference between these groups and the group of principals with 3 or fewer years of experience. The fact that these groups show negative coefficients means that their professional development experiences are associated with smaller gains in student achievement than those of inexperienced principals.

Source: Learning Policy Institute. (2022).

As Figure 5 shows, the score gains for students of veteran principals with less extensive professional development are greater than the score gains for students of early-career principals under the same circumstances; however, the gains for students of early-career principals with substantial access to professional development are much more dramatic than those for students of veteran principals. In essence, extensive professional development appears to help early-career principals catch up to the effectiveness of their more experienced colleagues.

Interestingly, the veteran group of principals (10+ years of experience) also appears to benefit slightly more than the mid-career group (4–9 years of experience). This makes sense when one considers that early-career teachers have an enormous amount to learn, and those who are much later in their careers, while benefiting from their work experience, are also further from their initial training. Thus, they may lack some critical elements of more recently emphasized knowledge and skills in the areas that professional development provides.

Figure 5
Student Gains in Mathematics, by Principal Experience, for Principals With Differential Access to Professional Development



Source: Learning Policy Institute. (2022).

Principal Professional Development and Student Characteristics

Many studies find that school resources of various kinds—more funding, better-qualified staff, higher-quality programs—have even stronger effects on the achievement of students furthest from opportunity than on other students.[13] We wondered whether the effect of principal learning on student outcomes differed depending on students' racial/ethnic backgrounds. This issue is important because the lack of access to high-quality schools, well-prepared teachers, and adequate curricular materials has led to less opportunity to learn and, thereby, lower achievement for historically underserved students.[14]

We asked this question: At schools where students are led by principals with access to extensive professional development, is there a smaller gap in achievement gains between historically underserved students of color and other groups? We define historically underserved students as Black, Latino/a, and Native American students, based on California demographics and achievement trends. We compared their gains to those of white students, Asian students (including Filipino students), and other students (multiracial students and those who did not report a racial category). Asian students served as our reference group because they had the highest 1-year gains, on average.

We found that, as principals' experience of professional development in instructional leadership increases, gains in mathematics are significantly more pronounced for historically underserved students of color and, to a somewhat lesser extent, for students identified as "Multiracial & Other" than for white and Asian students. (See Table 6.) For gains in English language arts, the effect of principal professional development does not show statistically significant differences across the four racial/ethnic groups.

Table 6
Relationship Between Professional Development Factors and Student Gains in Mathematics, Relative to Student Racial/Ethnic Group

Student Racial/ Ethnic Group	Professional Development Overall	Professional Development Frequency	Managing Change	Leading Instruction	Shaping a Positive School Climate	Developing People	Meeting Needs of Diverse Learners
Main Effect	0.603	0.516	0.752	-0.04	0.476	0.979~	0.374
Asian	(Reference)						
Historically Underserved Students of Color	0.948	0.624	0.71	1.654*	0.181	0.316	0.87
White	0.218	0.11	0.278	0.791	0.079	-0.344	0.05
Multiracial & Other	1.297	1.3	0.998	1.289	0.704	0.615	1.131

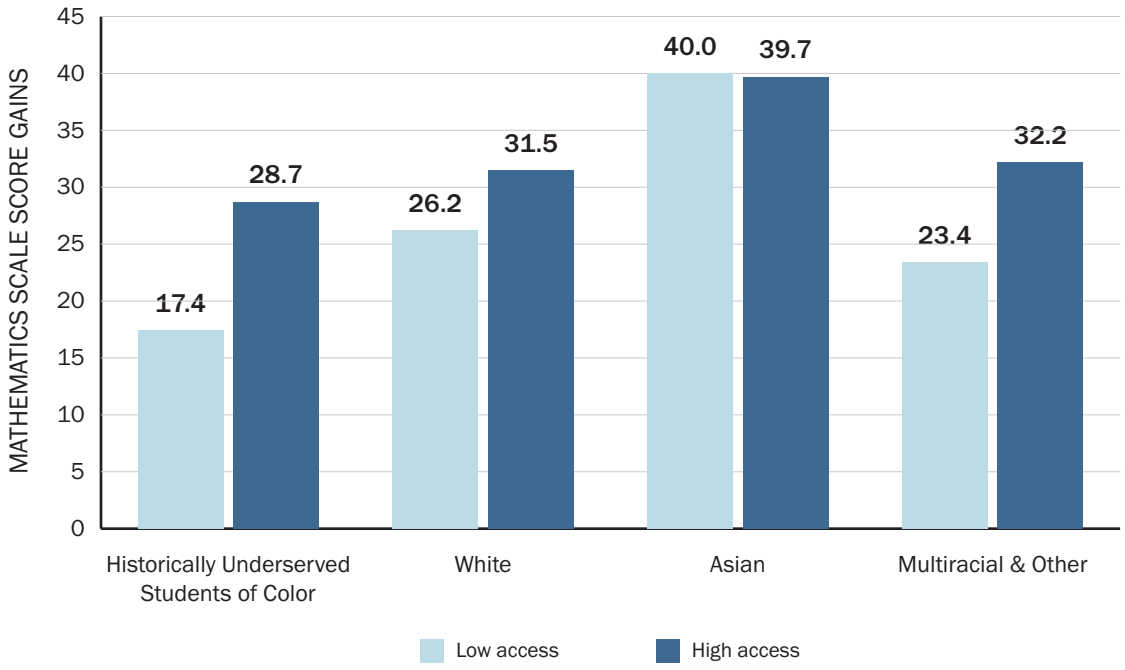
Notes: ~ is $p<0.10$; * is $p<0.05$; ** is $p<0.01$; *** is $p<0.001$.

The positive "main effect" regression coefficients indicate that as the strength of the professional development factor increases for principals, so does the mean student achievement in mathematics for Asian students. The value of the "Historically Underserved Students of Color," "White," and "Multiracial & Other" regression coefficients indicates the difference between gains for each of those student groups and gains for Asian students, respectively.

Source: Learning Policy Institute. (2022).

Figure 6 illustrates model predictions for students from different racial/ethnic groups. For historically underserved groups, there is a large, positive difference—estimated to be 11.3 points on the mathematics assessment, or about 3.5 months of instructional time—between the predicted gain of students in the school led by a principal with little access to professional development in instructional leadership and peers in a school led by a principal with more substantial access. Our model also predicts a difference—estimated to be 8.8 points on the mathematics assessment—for students in the "Multiracial & Other" category (multiracial or race not reported). For white students, the predicted gain for those with a principal who has extensive professional development is somewhat higher (5.3 points) than for those with a principal who has little access to professional development, but the difference is not statistically significant. For students who are Asian, the model predicts almost no difference between the two groups, likely because their average scores are already very high.

Figure 6
Student Gains in Mathematics (Scale Score Points), by Race/Ethnicity, for Principals With Differential Access to Professional Development in Instructional Leadership



Source: Learning Policy Institute. (2022).

Based on our analysis, we conclude that access to professional development in instructional leadership for principals could benefit most students. However, the potential benefit for students from historically underserved groups is greater. Thus, principal professional development may play a key role in reducing racial/ethnic opportunity gaps.

Discussion and Conclusion

This new analysis—highly unusual in the literature both because of the detail it offers about principals' professional learning and the controls made possible by the extensive multilevel data set—adds to our understanding of both the impact of professional learning and the importance of quality. Because the analysis is based on a cross-sectional analysis of data at a single point in time, we cannot rule out that other factors may have contributed to the correlations we saw between high-quality professional learning opportunities and teacher retention and student achievement. Nonetheless, while not definitive, the evidence is quite promising.

Our analysis suggests that principal learning matters for both teacher and student outcomes. Teachers in schools served by well-prepared principals are less likely to transfer schools or quit the profession than teachers in schools served by less well-prepared principals. In addition, principals who experience higher-quality internships during their preparation lead schools in which students make greater year-to-year gains in English language arts, compared to students in schools whose principals did not experience high-quality internships. One way to interpret these findings is that high-quality preparation programs—defined in part by the quality of the clinical internship that principals experience—may prepare principals to create a supportive, collegial environment for teachers that encourages them to stay.

Furthermore, greater access to professional development is associated with gains in both English language arts and mathematics, with particularly large gains for students in the schools of early-career principals and for historically underserved students of color. Professional development programs, especially those focused on instructional leadership, appear to help principals develop specific means to support teaching and learning for those furthest from opportunity.

Finally, our findings suggest that principal professional development can be a key factor in helping early-career principals more quickly reach the effectiveness levels of their more experienced peers. While the relationships we observed do not prove a causal relationship, they are promising evidence that principals' engagement in high-quality and in-service learning opportunities is positively related to the stability of the teaching force and the academic achievement of students.

In other analyses, our research team discovered that California principals have greater and more equitable access to high-quality preparation and professional development than most principals nationally, in large part as a function of recent reforms of principal preparation, licensing, and accreditation, along with substantial investments in professional development.[15] More recently, the state has designed and implemented an Administrator Performance Assessment as part of preservice preparation and launched a 21st Century California School Leadership Academy to provide ongoing learning opportunities. Future research exploring the relationships between these initiatives and principals' effectiveness would be instructive.

Appendix A: Data and Methods

Data Sources

California Principal Survey. The California Principal Survey asked principals about their learning experiences and professional development needs for the following four areas: (1) supporting classrooms focused on deeper learning (e.g., implementation of new standards, conceptual understanding of content, problem-solving and research skills, and social and emotional development); (2) developing adults as members of an instructional team; (3) redesigning school organizations to better support student and adult learning and community connections; and (4) managing change. The survey addressed both principal preparation and professional development experiences as well as career satisfaction and mobility plans. It was administered by the American Institutes for Research in spring 2017 to a representative sample of California principals in 900 schools; 462 school principals provided sufficient data to be classified as respondents, achieving a response rate of 51%. A copy of the survey can be found in the technical supplement to *Developing Effective Principals*.[16]

California Department of Education Restricted Staffing Data. The California Department of Education's restricted-use staffing data includes information about all California public school teachers and most California public school principals and administrators. We relied on data about teacher characteristics and their employment decisions for 2016–17 as the base school year and 2017–18 as the follow-up school year. We used data about teachers' genders, ages, races/ethnicities, years of teaching, educational attainment, and teaching fields to control for teacher characteristics that might be associated with their mobility. We also used data about principals' genders, ages, races/ethnicities, years of teaching experience, and years of principal experience for those same years.

California Department of Education Restricted Student Achievement Data. The California Department of Education's restricted-use student achievement data files include student-level information for all students attending California public schools and taking the California Assessment of Student Performance and Progress (CAASPP). We relied on grades 3 through 8 student test data from 2015 as the base year for measuring gains in achievement for 2016, and 2016 as the base year for measuring gains in achievement for 2017. We used student scale scores for mathematics and English language arts, as well as data about students' genders, ages, races/ethnicities, economically disadvantaged status, English learner status, migrant status, and disability status, to control for student characteristics that might be associated with achievement outcomes.

U.S. Department of Education National Center for Education Statistics, Common Core of Data. We included school and district information from the U.S. Department of Education National Center for Education Statistics, Common Core of Data, Public Elementary and Secondary School Universe Survey from 2014–15. We relied on 2014–15 data because this was the most recent year of data available when we constructed the survey of California school principals. We used these data for information about a school's racial/ethnic student demographics, student–administrator ratio, percentage of students from low-income families, and the grade levels offered, as well as about district urbanicity and per-pupil expenditures.

Measures

Outcome measures

The above data sources allowed us to examine two outcomes: (1) teacher retention and (2) student achievement gains. These two outcomes were defined as follows:

1. Teacher retention: Whether an individual who was teaching in year 1 returned to teach in their school in year 2 (as opposed to transferring schools or leaving teaching in California).

2. Student gains: The CAASPP Smarter Balanced scale score in English language arts or mathematics in year 2, controlling for the score in year 1.

Measures of preparation quality

Preparation Quality Index. Using confirmatory factor analysis, we developed an index factor from 22 survey items that indicate quality preparation. (See Table A1.) Using the weightings of each variable on this factor and responses to the survey items, each principal received an index score to reflect the quality of preparation received. Scores range from 1 (low quality) to 10 (high quality).

Component Factors. Our factor analysis revealed six factors for preparation: (1) quality internship, (2) applied learning, (3) learning about leading instruction, (4) learning about shaping a positive school climate, (5) learning about developing people, and (6) learning about meeting the needs of diverse learners. The weightings on these factors, combined with responses to the relevant survey items, were used to develop scores for each respondent on each of these factors, reflecting aspects of the preparation they had experienced. Scores on each subcomponent range from 1 (low quality) to 10 (high quality).

Table A1
Factors and Indicators of Quality Preparation

Indicator name	Description
Quality Internship	
Internship Responsibilities	I had responsibilities for leading, facilitating, and making decisions typical of an educational leader.
Leadership Perspective	I was able to develop an educational leader's perspective on school improvement.
Alignment With Coursework	My internship or field experience was tightly aligned with theory and coursework.
Applied Learning	
Problem-Based Learning	The program used problem-based learning approaches, such as action research or inquiry projects.
Field-Based Learning	The program used field-based projects in which I applied ideas from my coursework to my experience in the field.
Collegial Environment	The program emphasized how to create collegial and collaborative work environments.

Indicator name	Description
Leading Instruction	
Instructional Leadership for Higher-Order Skills	The program emphasized instructional leadership (IL) focused on how to develop students' higher-order thinking skills.
Instructional Leadership for Tested Achievement	The program emphasized IL focused on raising schoolwide achievement on standardized tests.
Instructional Leadership for Curriculum	The program emphasized how to select effective curriculum strategies and materials.
Instructional Leadership for Implementing Standards	The program emphasized how to lead instruction that supports implementation of new California state standards.
Shaping a Positive School Climate	
Supporting Diverse Students	The program emphasized how to lead schools that support students from diverse ethnic, racial, linguistic, and cultural backgrounds.
Supporting Social and Emotional Learning	The program emphasized how to lead schools that support students' social and emotional development.
Supporting Whole Child Needs	The program emphasized how to develop systems that meet children's needs and support their development in terms of physical and mental health.
Supporting Restorative Practices	The program emphasized how to create a school environment that develops personally and socially responsible young people and that uses discipline for restorative purposes.
Developing People	
Designing Professional Development	The program emphasized how to design professional learning opportunities for teachers and other staff.
Supporting Learning Cycles	The program emphasized how to help teachers improve through a cycle of observation and feedback.
Recruiting and Retaining Staff	The program emphasized how to recruit and retain teachers and other staff.
Managing Operations	The program emphasized how to manage school operations efficiently.
Investing Resources for Improvement	The program emphasized how to invest resources to support improvements in school performance.
Meeting the Needs of Diverse Learners	
Meeting the Needs of English Learners	The program emphasized how to meet the needs of English learners.
Meeting the Needs of Students With Disabilities	The program emphasized how to meet the needs of students with disabilities.
Equitably Serving All Children	The program emphasized how to equitably serve all children.

Note: Factors denoted in bold.

Source: Learning Policy Institute. (2022).

Measures of professional development

Professional Development Index. Using confirmatory factor analysis, we developed an index factor from 18 survey items that indicate the extent and nature of the professional development to which principals have had access. (See Table A2.) Using the weightings of each variable on this index factor, applied to individual responses to the survey items, each principal received an index score to reflect their access to professional development. Scores range from 1 (low access) to 10 (high access based on both the frequency and the topics covered by professional development).

Component Factors. Our factor analysis revealed six factors for professional development: (1) professional development frequency, and access to professional development for (2) managing change, (3) leading instruction, (4) shaping a positive school climate, (5) developing people, and (6) meeting the needs of diverse learners. The weightings on these factors, combined with responses to the relevant survey items, were used to develop factor scores for each respondent to reflect aspects of the professional development they experienced. Scores on each factor range from 1 (low access) to 10 (high access).

Table A2
Factors and Indicators of the Extent of Professional Development

Indicator name	Description
Professional Development Frequency	
How often have I participated in the following?	
Workshops	Workshops, conferences, or training
Peer Observation and/or Coaching	Peer observation and/or coaching in which I have an opportunity to visit with other principals for sharing practice
Principal Network	A principal network (e.g., a group of principals organized by my district, by an outside agency, or online)
Managing Change	
Using Data for Improvement	The program emphasized how to use student and school data to inform continuous school improvement.
Leading Change for Improved Achievement	The program emphasized how to lead a schoolwide change process to improve student achievement.
Leading Instruction	
Instructional Leadership for Higher-Order Skills	The program emphasized instructional leadership (IL) focused on how to develop students' higher-order thinking skills.
Instructional Leadership for Tested Achievement	The program emphasized IL focused on raising schoolwide achievement on standardized tests.
Instructional Leadership for Curriculum	The program emphasized how to select effective curriculum strategies and materials.
Instructional Leadership for Implementing Standards	The program emphasized how to lead instruction that supports implementation of new state standards.

Indicator name	Description
Shaping a Positive School Climate	
Supporting Diverse Students	The program emphasized how to lead schools that support students from diverse ethnic, racial, linguistic, and cultural backgrounds.
Supporting Social and Emotional Learning	The program emphasized how to lead schools that support students' social and emotional development.
Supporting Whole Child Needs	The program emphasized how to develop systems that meet children's needs and support their development in terms of physical and mental health.
Supporting Restorative Practices	The program emphasized how to create a school environment that develops personally and socially responsible young people and that uses discipline for restorative purposes.
Developing People	
Designing Professional Development	The program emphasized how to design professional learning opportunities for teachers and other staff.
Supporting Learning Cycles	The program emphasized how to help teachers improve through a cycle of observation and feedback.
Recruiting and Retaining Staff	The program emphasized how to recruit and retain teachers and other staff.
Managing Operations	The program emphasized how to manage school operations efficiently.
Investing Resources for Improvement	The program emphasized how to invest resources to support improvements in school performance.
Meeting the Needs of Diverse Learners	
Meeting the Needs of English Learners	The program emphasized how to meet the needs of English learners.
Meeting the Needs of Students With Disabilities	The program emphasized how to meet the needs of students with disabilities.
Equitably Serving All Children	The program emphasized how to equitably serve all children.

Note: Factors denoted in bold.

Source: Learning Policy Institute. (2022).

Data Analytic Methods

Factor analyses

We used a statistical software package, Mplus Version 8, to conduct confirmatory factor analyses to identify the factor variables. Mplus is particularly suited to analyses involving latent variables, such as confirmatory factor analysis and structural equation modeling.[17] Goodness-of-fit statistics showed that both our one-factor and our six-factor models met generally accepted criteria.

Regression analyses

We used regression analyses to model relationships as follows:

- To model teacher retention, we used logistic regression to estimate the odds that a teacher would stay at their school for an additional year. This analysis took into account teacher traits, such as years of experience, that might otherwise influence retention rates, as well as school and district characteristics.
- To model student achievement gains, we used linear regression to predict student test scores in a particular year. This analysis controlled for students' test scores in the immediate prior year, along with other student, school, and district characteristics. Student achievement gains were modeled separately for English language arts and mathematics.
- To model interaction effects, we used the same base model for student achievement gains. For the first analysis, we interacted the professional development factors with the principal experience variable. For the second analysis, we interacted the professional development factors with the student racial/ethnic group variable.

The samples for each set of analyses differed. For the preparation analyses, we limited the sample to principals who were early in their careers (5 years of experience or less), based on the assumption that they would rely more on their preparation, in contrast to principals with more experience, who would rely more on their experience. This sample included approximately 200 principals, 6,000 teachers, and 59,000 students. The professional development sample included all principals who reported participating in professional development within the prior 2 years. This sample included approximately 460 principals, 14,000 teachers, and 314,000 students.

Multilevel modeling

We employed a stratified sampling procedure when constructing the survey of California principals. To take into account the multilevel nature of the sampling, we employed the following procedures during our analysis.

For teacher retention

The strata at the first level were a combination of Association of California School Administrators (ACSA) membership and school level. The sampling unit at the first level was principals (variable name *principalid, N*=435). Sampling weights were utilized so that sample characteristics would more closely match characteristics of the population of California principals. Each observation was a *teacherid* (*N*=14,676) and that teacher's career decision during the analytic window (base year of 2016–17; follow-up year of 2017–18). Each teacher had one career decision in the data set: whether they stayed, moved, or left at the end of the 2016–17 school year.[18]

Table A3
Distribution of Observations Across Strata for Teacher Retention Analysis

Strata		*N* of Principals	*N* of Teachers	*N* of Teachers per Principal		
				Minimum	Mean	Maximum
ACSA	Comprehensive	3	70	8	23.3	45
ACSA	High	48	3,032	4	63.2	130
ACSA	Middle	41	1,460	11	35.6	61
ACSA	Primary	184	4,747	4	25.8	62
Non-ACSA	Comprehensive	6	108	4	18	40
Non-ACSA	High	26	2,024	4	77.8	139
Non-ACSA	Middle	26	848	3	32.6	79
Non-ACSA	Primary	101	2,387	1	23.6	58
Total	8	435	14,676	1	33.7	139

Source: Learning Policy Institute. (2022).

For student gains

The strata at the first level were a combination of ACSA membership and school level. The sampling unit at the first level was principals (variable name *principalid, N*=383). Sampling weights were utilized so that sample characteristics would more closely match characteristics of the population of California principals. The strata at the second level included students (variable name *studentid, N*= 216,820). Each observation was a student test score in either English language arts or mathematics during the analytic window (year 1 in 2015 and year 2 in 2016; year 1 in 2016 and year 2 in 2017). Therefore, an individual student could have up to four scores in the data set.[19]

Table A4
Distribution of Observations Across Strata for Student Gains Analysis

Strata		*N* of Principals	*N* of Test Scores	*N* of Test Scores per Principal		
				Minimum	Mean	Maximum
ACSA	Comprehensive	3	1,823	229	607.7	1,077
ACSA	High	4	1,765	59	441.3	1,140
ACSA	Middle	44	85,240	272	1,937.30	4,065
ACSA	Primary	190	143,725	13	756.4	3,210
Non-ACSA	Comprehensive	7	2,027	19	289.6	1,116
Non-ACSA	High	2	257	84	128.5	173
Non-ACSA	Middle	28	48,385	101	1,728.00	6,079
Non-ACSA	Primary	105	60,464	1	575.8	2,216
Total	8	383	343,686	1	897.4	6,079

Source: Learning Policy Institute. (2022).

Modeling teacher turnover

We used California Department of Education staffing data from the 2016–17 school year to identify teachers who were in schools led by principals selected in our survey. We used the 2017–18 years of data to determine whether a teacher stayed in their school, moved schools, or left the California public education system. We fit the following logistic regression model separately for preparation and for professional development factors. Our statistical model is as follows:

$$\Pr\,(STAY = 1)_t = \frac{e^f}{1 + e^f}$$

$$f = \beta_0 + \beta_1 ProgramCharacteristic + \beta_2{}' TeacherCharacteristics + \beta_3{}' PrincipalCharacteristics + \beta_4{}' SchoolCharacteristics + \beta_5{}' DistrictCharacteristics + \varepsilon$$

We estimated the probability that a given teacher (*t*) in a school led by a principal selected in our survey would stay in that school the following year. β_1 represents the parameter of interest: the characteristics of the principal's preparation or professional development programs. β_2, β_3, β_4, and β_5 represent the vectors of parameters to capture the effects of teacher, principal, school, and district characteristics. The model also included a constant and a random error term. We used the *svy logit* routine in Stata 15 to conduct the analyses of teacher retention.

Modeling student gains

We used CAASPP Smarter Balanced test data from 2014–15 through the 2017–18 school year to identify English language arts and mathematics test scores for students who were in schools led by principals selected in our survey. We used scores for grades 4 to 8. We omitted grade 3 and grade 11 since these students do not have prior-year scores. To address our research questions, we fitted models similar to the following:

$$CAASPP\ Scale\ Score\ Year\ 2 = \beta_0 + \beta_1 ProgramCharacteristic + \beta_2 Year1ELA + \beta_3 Year1Math + \beta_4{}' StudentCharacteristics + \beta_5{}' PrincipalCharacteristics + \beta_6{}' SchoolCharacteristics + \beta_7{}' DistrictCharacteristics + Grade\ fixed\ effect + Year\ fixed\ effect + \varepsilon$$

We estimated the CAASPP scale score for each student. β_1 represents the parameter of interest: the characteristics of the principal's preparation or professional development programs. β_2 and β_3 capture the effects of prior-year scores. β_4, β_5, β_6, and β_7 represent the vectors of parameters to capture the effects of our student, school, principal, and district covariates. We included a grade fixed effect to capture any test idiosyncrasies that have to do with the test at a particular grade. We also included a year fixed effect to capture any idiosyncrasies that may have affected student scores in a particular year. The model also includes a constant and a random error term. We used the *svy regress* routine in Stata 15 to conduct the analyses of the student gains.

Illustrations

For key findings, we provided prototypical comparisons, or margins, to more clearly illustrate the relationships. Margins are forecasts calculated by first fitting a statistical model and then entering fixed values of key variables into that model while averaging or otherwise integrating the remaining variables.[20] It is important to note that the illustrations are not descriptive statistics; that is, they are not simple averages calculated from sample values. They are more akin to an online calculator that estimates how much money a person will have in retirement (the forecast) after they enter how much they are able to save each month (the key variable), while inflation (a remaining variable) is assumed to continue at the current rate.

For the teacher retention models, the outcome calculated is the predicted probability that the teacher would stay, when the quality and extent of principal learning are fixed first at a low level and then at a high level. For the student gain models, the outcome calculated is the predicted mean test score, when the quality and extent of principal learning are fixed first at a low level and then at a high level. For the principal experience and student race and ethnicity group models, both the principal learning variables and the group variables are fixed at specific values to provide policy-relevant comparisons. We used the *margins* routine in Stata 15 to conduct the analyses for the illustrations.

Endnotes

1. Grissom, J. A., Egalite, A. J., & Lindsay, C. A. (2021). *How principals affect students and schools: A systematic synthesis of two decades of research*. (p. 43). The Wallace Foundation. https://www.wallacefoundation.org/knowledge-center/pages/how-principals-affect-students-and-schools-a-systematic-synthesis-of-two-decades-of-research.aspx

2. Grissom, J. A., Egalite, A. J., & Lindsay, C. A. (2021). *How principals affect students and schools: A systematic synthesis of two decades of research*. (p. 43). The Wallace Foundation. https://www.wallacefoundation.org/knowledge-center/pages/how-principals-affect-students-and-schools-a-systematic-synthesis-of-two-decades-of-research.aspx; Leithwood, K., & Louis, K. S. (2012). *Linking Leadership to Student Learning*. Jossey-Bass; Sutcher, L., Podolsky, A., & Espinoza, D. (2017). *Supporting principals' learning: Key features of effective programs* [Fact sheet]. Learning Policy Institute.

3. Darling-Hammond, L., Wechsler, M. E., Levin, S., Leung-Gagné, M., & Tozer, S. (2022). *Developing effective principals: What kind of learning matters?* [Report]. Learning Policy Institute. https://doi.org/10.54300/641.201

4. Grissom, J. A., Egalite, A. J., & Lindsay, C. A. (2021). *How principals affect students and schools: A systematic synthesis of two decades of research*. The Wallace Foundation. https://www.wallacefoundation.org/knowledge-center/pages/how-principals-affect-students-and-schools-a-systematic-synthesis-of-two-decades-of-research.aspx

5. Principal control variables include age, race/ethnicity, years of experience teaching, and years of experience as a principal. School and district control variables include urbanicity, racial/ethnic student demographics, student–administrator ratio, district per-pupil expenditure, percentages of students from low-income families, and the grade levels offered by a school. Teacher control variables for the retention analysis include gender, age, race/ethnicity, years of teaching, educational attainment, and teaching field. Student control variables for the gain analysis include gender, age, race/ethnicity, economically disadvantaged status, English learner status, migrant status, and disability status, as well as prior-year test scores.

6. Sutcher, L., Podolsky, A., & Espinoza, D. (2017). *Supporting principals' learning: Key features of effective programs* [Fact sheet]. Learning Policy Institute.

7. Our principal learning measures were scaled to range from 1 to 10. However, for some of the measures, few principals had scores at the extremes. Therefore, we selected scores of 2 and 9 to represent low- and high-quality learning, respectively.

8. We also examined this relationship for one large district in California in which there were approximately 600 teachers in schools served by early-career principals. We found that the relationship between principals' average Preparation Quality Index score and teacher retention was still positive, although with this much smaller sample, the difference was not statistically significant.

9. Darling-Hammond, L., Wechsler, M. E., Levin, S., Leung-Gagné, M., & Tozer, S. (2022). *Developing effective principals: What kind of learning matters?* [Report]. Learning Policy Institute. https://doi.org/10.54300/641.201

10. For the effect size, we converted the difference in gain to standard deviation units by dividing the difference in scale score points by the standard deviation of the difference between year 1 and year 2 scores (English language arts: 55.7; mathematics: 52.5) as suggested by Soland, J., & Thum, Y. M. (2019). *Effect sizes for measuring student and school growth in achievement: In search of practical significance* [EdWorkingPaper 19-60]. https://doi.org/10.26300/b5as-wr12

11. We calculated the number of days of instruction using the average gain in our sample of students in grades 3 through 8 in California. For each subject, we divided the average year 1 to year 2 gain by 180 days of school.

12. For the effect size, we converted the difference in gain to standard deviation units by dividing the difference in scale score points by the standard deviation of the difference between year 1 and year 2 scores (English language arts: 55.7; mathematics: 52.5) as suggested by Soland, J., & Thum, Y. M. (2019). *Effect sizes for measuring student and school growth in achievement: In search of practical significance* [EdWorkingPaper 19-60]. https://doi.org/10.26300/b5as-wr12

13. Darling-Hammond, L. (2019). *Investing for student success: Lessons from state school finance reforms*. Learning Policy Institute. https://learningpolicyinstitute.org/product/investing-student-success-school-finance-reforms

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16. Leung-Gagné, M., Levin, S., & Wechsler, M. E. (2022). *Developing effective principals: What kind of learning matters?* [Technical supplement]. Learning Policy Institute. https://learningpolicyinstitute.org/product/developing-effective-principals

17. Muthén, L. K., & Muthén, B. O. (1998–2017). *Mplus User's Guide*. Eighth edition. Muthén & Muthén.

18. By using the *svy* procedures in Stata 15, we adjusted the standard errors to take into account that test scores are nested within students and that students are nested within principals/schools. StataCorp. (2017). *Stata 15 Base Reference Manual*. Stata Press.

19. By using the *svy* procedures in Stata 15, we adjusted the standard errors to take into account that test scores are nested within students and that students are nested within principals/schools. StataCorp. (2017). *Stata 15 Base Reference Manual*. Stata Press.

20. StataCorp. (2017). *Stata 15 Base Reference Manual*. Stata Press.

About the Authors

Ayana Kee Campoli served as a Senior Researcher for the Learning Policy Institute (LPI) and as a member of LPI's Educator Quality team. She sought to inform policy and practice by using critical quantitative methods to analyze large-scale data on school leaders, teachers, and students. Prior to joining LPI, Campoli was an assistant professor at Augusta University, where she taught courses on research methods and published work on education policy and leadership. Currently, she serves as an educator in Dekalb County, Georgia, where she teaches young students of color from low-income families. Campoli holds an Ed.D. in Education Policy, Leadership, and Instructional Practice from Harvard University.

Linda Darling-Hammond is President of the Learning Policy Institute and is the Charles E. Ducommun Professor of Education Emeritus at Stanford University. She is past President of the American Educational Research Association and recipient of its awards for Distinguished Contributions to Research, Lifetime Achievement, and Research-to-Policy. She is also a member of the American Association of Arts and Sciences and of the National Academy of Education. Among her more than 600 publications are *Preparing Principals for a Changing World* and a number of award-winning books on the education profession, including *The Right to Learn*, *Teaching as the Learning Profession*, *Preparing Teachers for a Changing World*, and *The Flat World and Education: How America's Commitment to Equity Will Determine Our Future*. She received an Ed.D. from Temple University (with highest distinction) and a B.A. from Yale University (magna cum laude).

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