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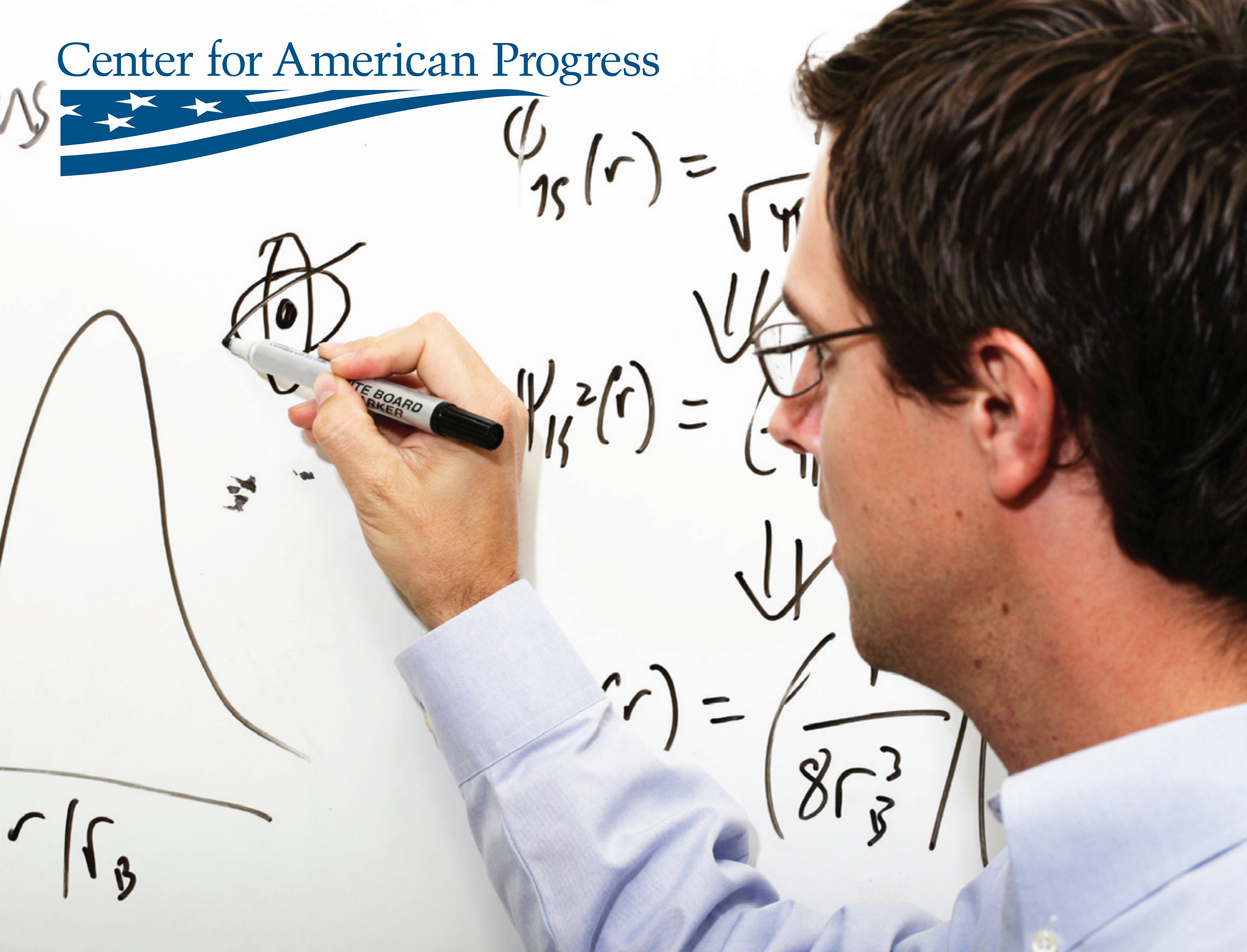

Financial Incentives for Hard-To-Staff Positions

Cross-Sector Lessons for Public Education

Julie Kowal, Bryan C. Hassel, and Emily Ayscue Hassel Public Impact

Research assistance from Dana Brinson

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Executive summary

Schools across the country struggle to attract and retain effective teachers in "hard-to-staff" subject areas, such as math and science. They also struggle with retaining and attracting effective teachers in hard-to-staff schools—those that have a history of low performance, enroll high proportions of disadvantaged students, or are located in poor urban or isolated rural areas.

How can states and districts recruit and retain larger numbers of effective teachers in these schools and subject areas? One approach is to change compensation—to pay teachers more, through salary adjustments or incentives, for working in particular schools and subject areas. Unlike across-the-board pay raises, differentiated pay for these positions aims to make up for differences in the level of challenge teachers face in hard-to-staff schools or the higher pay available outside of education to people with certain expertise.

Though several districts and states are experimenting with hard-to-staff pay, education leaders have little research about the effectiveness of these programs or practical guidance on which to base the design of new ones.

Outside of education, however, in civil service, the military, the medical field, and private industry, paying more for hard-to-staff positions, or "market pay," is common practice. Rural communities often struggle to recruit a sufficient number of high-quality nurses and physicians, the military has committed to filling even its most dangerous jobs with an all-volunteer force, and human resource directors in the private sector are familiar with the ebbs and flows of supply and demand in many positions. Across these sectors, bonuses and other incentives are used as a matter of course to attract a greater number of applicants, increase retention, and increase staff performance.

Each of these sectors offers significantly more research about the *effectiveness* of incentive programs than can be found in education. Due to the number of programs and depth of experience, they also offer practical lessons about their *design* and *implementation*. For this report, we collected research and experience from across sectors to help guide state and district leaders as they design and refine hard-to-staff programs in public education.

Many of the approaches we explore here, such as job auctions, are rarely if ever used in U.S. public education. Others are better known, though still infrequent in education, including various forms of recruitment incentives and performance-contingent bonuses. The rarity of these solutions in public education highlights what is perhaps our most important finding from cross-sector experience: The education sector stands alone in its extreme reluctance to modify compensation in service of its ultimate mission. In the realm of compensation reform, the politics of parity have largely trumped the sector's will to succeed. Nowhere is the terrible consequence of our misalignment of resources more evident than in the nation's hardest-to-staff classrooms and most disadvantaged schools.

Based on our review of research on hard-to-staff pay programs in both the public and private sectors, as well as interviews with experts in fields with significant experience addressing hard-to-staff positions, we offer the following additional lessons for policymakers in education. These lessons are intended as a launch pad for the detailed compensation design required to implement hard-to-staff pay reforms effectively in education.

Compensation is powerful. In most other sectors, the question of whether to use pay to fill hard-to-staff positions is rarely even raised. Experts from across sectors agree that using compensation as a tool to address staffing challenges is a no-brainer, an integral part of business as usual that responds to the economic principle of "compensating differentials" and the realities of a changing labor market. With more expenditures tied up in personnel than almost any other aspect of an organization, compensation is one of managers' and policymakers' most powerful and manipulable tools to address staffing shortages. And there is compelling evidence that targeted incentives work—research and experience from each of the sectors we reviewed suggests that financial incentives can be highly effective for both recruitment and retention in hard-to-staff positions.

A "portfolio" of incentives may be most effective for a diverse candidate pool and workforce. The cross-sector evidence suggests that loan repayment programs, recruitment and retention bonuses, and salary supplements can all be highly effective in recruiting and retaining employees in hard-to-staff positions. Their success, however, depends largely upon the degree to which they are tailored to meet the specific needs of candidates and current employees. In education, a combination of loan repayment programs, recruitment bonuses, retention bonuses, performance bonuses, and other types of incentives may be the best approach to ensure that they are attractive to a variety of new candidates and current teachers.

Including a performance-based component boosts the recruitment and retention power of hard-to-staff pay. Compensation research from across sectors strongly suggests that adding a performance-based pay component to compensation consistently attracts and retains higher performers. In addition, the larger the performance-based pay opportunity available for a job, the higher its attraction for high performers. In education, policymakers' ultimate goal must be not only to increase the number of teachers in hard-to-staff schools and subject areas, but also to increase the quality. Providing rewards for performance could serve as an incentive for candidates who believe that they will succeed in these venues, thereby increasing the quality of the candidate pool and potentially its size, as well.

Hard-to-staff incentives in other sectors typically make up a substantial portion of recipients' total compensation. The cross-sector research does not offer a concrete formula for determining the most effective amount of hard-to-staff incentives. What is clear, however, is that employers across sectors are providing much larger incentives than the majority of hard-to-staff pay programs in education. Incentives between 10 percent and 30 percent of a teacher's salary would be more in line with other sectors.

Decisions about which "units" are hard to staff are best made at the top, but on-the-ground managers should have discretion over distribution and amounts. Research from the public, defense, and private sectors makes clear that decisions about which particular jobs or units of an organization are hard to staff are best made at the top, to allow leaders with a broad view of the organization's goals to prioritize staffing shortages across branches or divisions. But the evidence suggests it is the managers who work most closely with new candidates and staff who may be best suited to distribute the incentives and set individual incentive amounts. Translating this finding successfully to education will require education leaders to experiment with different levels of discretion, giving districts and school leaders varying levels of authority over incentive distribution and amounts, and monitoring the results.

Employers across sectors target a ready pool of candidates to help reduce the additional incentives required to get them into tough positions. Alongside financial incentives to address staffing shortages, successful organizations across sectors work to find candidates who already value certain aspects of the hard-to-fill job or who do not perceive the undesirable characteristics as drawbacks. Decades of economics research on "compensating differentials" have shown that most labor pools are heterogeneous when it comes to candidates' values and preferences for particular aspects of a job. Education leaders can also capitalize on this heterogeneity through the use of auctions or by investing in targeted recruitment for candidates who are inherently attracted to the conditions that make some schools harder to staff—and so will require less differentiation in pay or none at all.

Organizations frequently solve staffing problems by reorganizing their operations to eliminate the disamenity or the need for the position. Employers in other sectors are also likely to rethink the nature of hard-to-staff positions entirely. If a particular position is chronically difficult to fill—especially due to disamenities, which are challenging or undesirable working conditions that come with the job—successful organizations in other sectors will reorganize operations, often using new technologies to eliminate the disamenity or the need for the position entirely. Education leaders also should consider using technology to alter the roles and location of teaching staff. In its basic form, this might include delivering programmed instruction in hard-to-staff subjects, such as math, online. It also might include bringing the job to the people rather than the people to the job in hard-to-staff locations: Excellent content instructors can be located anywhere if their interactions with students occur through a combination of video, audio, and online technologies. Such solutions would both allow and require significant changes in staff roles at the schoolhouse level and in compensation for all who contribute to the instructional process.

Background

The inequitable distribution of teaching talent

It is well established that in the coming years, the United States will continue to face a shortage of high-quality teachers. It has become increasingly clear, however, that it is not the nation as a whole that experiences this shortage. Rather, the dearth of effective teachers is felt most keenly in particular schools and subject areas.[1]

Schools across the country struggle to attract teachers in "hard-to-staff" subject areas such as math and science—fields in which those who consider teaching often pursue higher-paying careers instead. Hard-to-staff *schools* are often located in poor urban or isolated rural communities, areas that may lack quality-of-life amenities that attract teachers to other districts. These schools also tend to serve a high proportion of low-income students and have a history of poor management and low student achievement—special challenges that are not typically balanced out by additional incentives or compensation.

A few statistics highlight the magnitude of the problem.

- High-poverty schools in rural and urban areas are up to 6.5 percent more likely than more affluent schools to have trouble filling teaching positions in special education and nearly 10 percent more likely to have trouble filling positions in math.[2]
- Math, science, English, and social studies teachers in high-poverty schools are significantly more likely to lack a major or a minor in their teaching field than those in more affluent schools.[3]
- In recent years, 20 percent of teachers in high-poverty schools had three or fewer years of teaching experience, compared with 11 percent of teachers in low-poverty schools.[4]

In both hard-to-staff schools and subject areas, education leaders often have no choice but to hire teachers who have temporary or emergency certification or who are in their first or second year of teaching, and assign them to teach outside their fields of expertise.[5]

This inequitable distribution of quality is particularly distressing to parents, education leaders, and policymakers not only because we know that teachers are the most important school-level factor in a student's learning, but also because students in high-poverty, low-performing schools are often those for whom an effective teacher matters the most.[6] Students who do not have access to highly effective teachers will continue to fall behind their peers, widening the persistent achievement gap between the "haves" and the "have-nots" in public education.

The No Child Left Behind Act has begun to increase the pressure on education leaders to correct staffing inequities: State departments must detail plans to ensure that inexperienced, uncertified, or out-of-field teachers are not disproportionately assigned to teach low-income and minority students. And districts must notify parents if their child is taught by a teacher who does not meet the law's definition of highly qualified.[7] Combined, these requirements make new recruitment of qualified teachers a superior solution to merely enticing existing teachers to move from wealthier to poorer schools.

What is the role of financial incentives?

How can states and districts recruit a greater number of effective teachers into these hard-to-staff schools and subject areas? One approach is to change compensation—to pay teachers more for working in particular schools and subject areas. Research in education suggests that compensation *alone* is generally not a sufficient motivator to get new candidates in the door or to encourage them to stay. The majority of teachers rank factors such as poor leadership above compensation as factors in their decision to leave a school.[8] Nonetheless, salary and other financial incentives are likely to be *necessary* to recruit and keep good teachers: About half cite low salary as a factor in their decision to leave teaching, and approximately two-thirds say that better salaries would encourage teachers to remain in the profession.[9] One recent survey found that low pay was the biggest concern for potential career-changers who are interested in becoming teachers.[10] In addition, surveys of employees across industries suggest that pay is a more important factor for high performers—exactly the kind of teachers that are needed in hard-to-staff schools and subject areas.[11]

Across-the-board pay raises are one strategy to address staffing shortages. But even if pay levels are higher overall, teachers' salaries in the great majority of districts are still tied up in schedules that reward degrees and experience—instead of supply, demand, or talent. With the same levels of pay across all schools, states and districts will still be hard-pressed to fill classrooms in their most disadvantaged schools when teachers can choose to work in a school with better leadership and more support. Raising overall salaries may make hard-to-staff subjects more attractive to potential candidates who could choose from an open market in math, science, engineering, or other high-demand industries. But across-the-board raises would be an enormously expensive solution for the few subjects that require a labor market premium.

Differentiated compensation is a much more flexible and targeted solution to address the market and amenity pressures that underlie these staffing shortages.[12] But this strategy raises many of its own questions, including:

- What forms of compensation are most effective in different circumstances?
- How much is "enough"?
- Who should determine which schools are hard to staff and distribute incentives to candidates and staff?
- What other (non-financial) strategies could help address these staffing challenges?

The value of cross-sector experience

In addition to a federal loan forgiveness program and a new TEACH grant for graduates who work in hard-to-staff positions, the U.S. Department of Education recently introduced the Teacher Incentive Fund, or TIF, which provides $99 million in grant funding to support district and state efforts to increase the number of effective teachers in high-need schools.[13] As a result of the TIF program and substantial local investments, many states and districts are experimenting with differentiated pay for hard-to-staff positions. *Education Week*'s "Quality Counts" report estimates that in 2007, 25 states had pay policies in place particularly to fill hard-to-staff positions. Of these, nine states adopted policies to provide incentives for teachers in targeted schools, five had policies focused on incentives for hard-to-staff subjects, and 11 had policies on the books designed to address both.[14] Available evidence suggests that in 2007, at least 19 school districts had adopted policies to offer their own financial incentives for hard-to-staff schools, and at least 38 districts adopted policies for teaching in a hard-to-staff subject area.[15] A state or district's written policy for hard-to-staff pay, of course, does not necessarily mean it is currently funded or fully implemented. We were unable to locate data on the percentage of teachers receiving hard-to-staff incentives, or on the amount of funding flowing to hard-to-staff incentives nationwide.

While there has been significant talk about hard-to-staff pay in education, there is very little research about its effectiveness.[16] Even amid increasing pressure to implement policies that address the inequitable distribution of teaching talent, and targeted resources to help provide remedies, district and state leaders have little guidance on which to base the design of new incentive programs in education.

Outside of education, however, in the medical field, civil service, the military, and private industry, "market pay" for hard-to-staff positions is common practice. Rural communities often struggle to recruit a sufficient number of high-quality nurses and physicians; the military has committed to filling even its most dangerous jobs with an all-volunteer force; and human resource directors in the private sector are familiar with the ebbs and flows of supply and demand in many positions. Across these sectors, bonuses and other incentives are used as a matter of course to attract a greater number of applicants, increase retention, and increase staff performance.[17]

Each of these sectors offers significantly more research about the *effectiveness* of incentive programs than can be found in education. Due to the number of programs and depth of experience, they also offer practical lessons about their *design* and *implementation*. The military and civil service, in particular, offer interesting lessons because these sectors have long used structured and regulated pay scales that are similar in many ways to the ubiquitous salary schedules in public education. Due to the public and potentially political nature of their compensation systems, lessons about the design and effectiveness of hard-to-staff incentives in these sectors may be especially relevant in education.

The goal of this paper is to capture and translate the research and experience from each of these sectors into meaningful lessons and implications for state and district leaders as they design and refine hard-to-staff programs in public education.

Methodology

We set out to gather lessons from other sectors about using pay to attract and retain highly qualified candidates in hard-to-staff positions. Specifically, our research sought to answer the following questions:

- What does the research from across sectors suggest are the most promising compensation strategies to attract highly qualified candidates into hard-to-staff positions?
- What lessons can those from other sectors who have designed, implemented, and studied hard-to-staff pay programs offer regarding the successful design and implementation of these programs?

We conducted a thorough literature review, including manual and keyword searches of EBSCO's Business Source Premier, BNET, *Harvard Business Review*, and *McKinsey Quarterly*; human resource and management journals such as *Journal of Human Resources, Compensation and Benefits Review, Human Resources Management,* and *Review of Public Personnel Administration*; and Google and Google Scholar. We used a broad range of keywords to account for varying terminology across sectors, including single and combination searches of the following terms:

- hard to staff
- hard to fill
- shortage
- incentive
- pay
- compensation
- recruit
- retain
- market pay
- differential pay
- hazard pay
- combat pay

We also reviewed literature from associations, advocacy organizations, and think tanks within specific industries that have historically faced shortages similar to those in public education, including the medical, legal, social services, civil service, and defense sectors. We also reached into the broader cross-sector compensation literature for lessons—not necessarily specific to hard-to-staff situations—that are applicable to the design of any successful pay program.

The majority of research on hard-to-staff pay arose in the medical field, civil service, and the military—sectors that are often publicly monitored, may follow salary schedules similar to those used in public education, and typically distribute monetary incentives based on set policy rather than individual managers' discretion. The literature from these fields describes and studies the impact of financial incentives for physicians and health specialists in rural and "medically underserved" areas; computer and technology specialists in state and federal agencies; and members of the military who have special foreign language skills or are assigned to combat or demolition duty or long-term duty at sea—just to name a few.

Our search yielded fewer quantitative studies about hard-to-staff pay programs in the private sector, because though surveys suggest that private companies are using differentiated pay to address staffing shortages, its use is rarely reported or publicly studied.

We supplemented the available research from these sectors with interviews with experts who have designed, implemented, and/or studied compensation programs designed to address staffing shortages in these fields. We are grateful to Saul Pleeter, deputy director of the *Tenth Quadrennial Review of Military Compensation*; James Hosek, senior economist at RAND; Donald Pathman of the Rural Health Research and Policy Analysis Center at the University of North Carolina; Pat Mackin, senior economist at the SAG Corporation, a personnel-focused research firm; Judi Ashbaugh of North Carolina's Office of Research, Demonstrations and Rural Health Development; Jeff Goodyear, director of health human resources policy at the Ontario Ministry of Health and Long-Term Care; and Ray Hunt, chief executive officer of Espanola General Hospital in northern Ontario. We conducted each interview over the phone following open-ended interview protocols.

Cross-sector findings

The following sections outline the major findings that arose from available research and expert interviews, including the importance of compensation as a strategy to recruit and retain high-quality staff; the particular forms of compensation that are most effective in particular circumstances; the amount of money that may be required; and the level—federal, state, local, or building—at which the incentives might best be distributed.

Why should leaders use *compensation* to address chronic staffing challenges?

It is clear from our review that in many other sectors, the question of whether to use compensation to fill hard-to-staff positions is rarely even raised. In the private sector, setting compensation at the level needed to attract and retain staff for a given job is integral to human resource practice. For private firms, compensation is typically informed by "compensating differentials," the economic principle that employers must offer additional income for workers in more undesirable jobs. And the labor market, like any market, pays more for resources that are scarce—such as individuals with specialized skills and knowledge.

Adam Smith pointed out both of these phenomena in *The Wealth of Nations* over two centuries ago, and cases of both are ubiquitous in today's economy. Although we could locate no surveys about the prevalence of hard-to-staff incentives across sectors, industry-specific surveys find a high proportion of employers offering financial incentives to recruit and retain employees, with percentages ranging from 35 percent to 86 percent in the surveys we reviewed.[18] And special incentives to fill hard-to-staff jobs are not limited to the private sector—the military, for example, devotes 7 percent of service members' total cash compensation to incentives of various kinds (see sidebar).[19]

In interviews, experts from across sectors agree that using compensation as a tool to address staffing challenges is a "no-brainer," for a combination of reasons that are applicable to public education leaders as well:

It's powerful. Across service sectors, employers typically spend a larger percentage of total expenditures on personnel than on any other single aspect of the organization. In education, the same is true: In 2006 (the most recent data reported), districts spent a collective

Hard-to-staff pay in the U.S. military

Branches of the U.S. military use Special and Incentive Pays, or S&I, to target specific staffing needs that are not addressed through base pay, improve recruiting and retention in critical shortage areas, or compensate for particularly hazardous or difficult assignments.

In 2006, the budget for S&I for the Air Force, Army, Navy, and Marines combined totaled approximately $5.2 billion—about 7 percent of total cash compensation for active duty military personnel. The majority of S&I funds are used for "reenlistment" bonuses for members who sign on for another term of service, incentives for medical specialists, and special incentives for members assigned to flying, sea, or foreign posts.

In 2008, military leaders employed 60 different types of S&I pays to address hard-to-staff positions. A sampling is listed below.

Type of S&I pay	Amount
Hostile fire pay	$225/month ($2,700 annual)
Imminent danger pay	$225/month ($2,700 annual)
Flight pay	$150-$350/month depending on experience ($1,800-$4,200 annual)
Submarine duty pay	≤$1,000/month ($12,000 annual)
Bonus – critical skills areas (officers)	≤$60,000
Bonus – registered nurses (officers)	≤$30,000
Bonus – dentists (officers)	≤$200,000

total of $262 billion on salaries and benefits—nearly 60 percent of total education expenditures in the United States.[20] With such an enormous portion of expenditures at stake, compensation clearly becomes one of the primary tools that organizations—and school systems—have at their disposal to effectively manage staff and performance.

It's manipulable. Human resources managers, researchers, and experts across fields report that monetary compensation is one of the most changeable aspects of any given job. Teachers are not the only professionals who rank factors other than pay as the most important in their decision about whether to enter or stay in a particular profession: Many surveys from other sectors suggest that induction, support, leadership, and other factors are more important in employees' decisions to enter or leave. But in most cases, none of these factors is as easy to modify in response to changing circumstances as pay.[21]

Jim Hosek, a senior economist at the RAND Corporation who has studied military compensation for decades, explains that "our research has shown very clearly that compensation is a highly manipulable element of the overall package that attracts a candidate to a particular occupation." Within any organization, compensation policies are typically set in advance and—within existing legal and regulatory constraints—may be adjusted on a regular basis to respond to different markets and adapt to changing circumstances.

States and districts have struggled for decades to find solutions for the organizational conditions that underlie chronically underperforming schools. These are arguably policymakers' most important concerns, as they affect not only teachers' working conditions but also students' learning—and they should not be abandoned in exchange for a new "silver bullet" in teacher compensation. But while policymakers and system leaders pursue a variety of strategies for reforming struggling schools, compensation can serve as an immediate, dynamic, and relatively easy-to-change tool for addressing staffing shortages.

It works. Evidence both within and outside education demonstrates that new candidates and current employees not only value monetary compensation, but will act in response to increases and changes in pay structure.[22] The cross-sector literature on pay for performance suggests that incentive pay programs consistently attract and retain higher performers, as measured by incoming credentials and subsequent success on the job.[23] And survey evidence bolsters the common-sense notion that money matters: For example, a recent survey of Generation X and Y employees in private industry by Towers Perrin found that 83 percent chose their employer based in part on starting pay.[24]

What *forms* of compensation are most effective under different circumstances?

Compensation can take many forms. Wages, which currently make up roughly two-thirds of the average employee's compensation, may be paid in the form of a base salary or any combination of special incentives.[25] This pay does not include benefits, which may consist of insurance, paid leave, retirement plans, and other components. Theoretically, any aspect of total compensation might be adjusted or supplemented to create an attractive package for current or prospective employees.

Here, we are concerned only with special incentives that can be layered on top of or used to adjust an employee's base salary. Within the range of special incentives, loan repayment programs, scholarships, recruitment or retention bonuses, and contingent salary supplements are the most common. All of these forms of compensation offer greater agility than changes to base salaries because they can be shifted from one area or employee to another as needs and performance change. These incentives also offer managers the ability to offer a large payment without making an ongoing commitment through increases to employees' base salaries.

The cross-sector research and our interviews suggest that there is no particular incentive plan or across-the-board formula for determining which *form* of monetary compensation is most effective for recruiting or retaining staff members in a particular industry or position. Instead, experts and research suggest that a "portfolio" of programs may be the best approach for any one organization—a combination of loan repayment programs, scholarships, bonuses, and other types of incentives.[26]

Overall, the effectiveness of any incentive program depends largely upon the degree to which the program is tailored to candidates' and employees' needs, values, and current circumstances.[27] However, research from the medical field, the U.S. military, and the civil service does offer a few key findings regarding the effectiveness and design of these incentives, which we outline separately below.

Loan Repayment Programs are common in industries where candidates' educational debt loads are high (physicians are a prominent example). These programs are typically targeted at recruiting new candidates by forgiving undergraduate or graduate loans in exchange for a certain period of service in a hard-to-staff position. A similar but distinct form of educational incentive is scholarship programs, which are typically distributed to current undergraduate or graduate students as they pursue their degree or specialization. The scholarship must be repaid if the candidate does not fulfill a period of service upon graduation, but if the service is completed, no repayment is necessary.

Scholarships and loan repayment programs may also be used for retention, to enable a current employee to pursue further education or specialization with the expectation that the employee will remain in his or her position for a specified time after completing the subsidized coursework.

- **Effectiveness.** There is strong evidence from fields where educational debt is common and typically high—including the medical field, information technology, and engineering—that loan repayment programs can be highly effective in both recruiting and retaining candidates in hard-to-staff positions.[28] In the medical profession, research suggests that 93 percent of participants in loan repayment programs complete their term of service in a hard-to-staff position, and roughly two-thirds stay for eight years or more.[29]

- **Versus scholarships.** Across sectors, research suggests that loan repayment programs are often more effective for both recruitment and retention than scholarship programs, largely because candidates commit to them at the end of their schooling rather than at the beginning. [30]

Donald Pathman, a university researcher in rural health incentive programs, explains that "loan repayment participants sign program contracts when they are older and much better informed [than scholarship recipients] … They know their and their family's needs, exactly where they will serve and if the site will fit their needs."[31]

Loan programs are also often easier to administer than scholarship programs. Scholarships are typically awarded in advance of a candidate's service, and must be collected—or converted into loans—if the candidate does not fulfill the required term. Loan repayment subsidies, on the other hand, can simply be discontinued if a candidate leaves in the middle of a term.

In response to cumulative findings about the effectiveness of loan repayment programs in the medical field, Congress recently acted to allow the National Health Service Corps, a program designed to recruit health professionals to underserviced areas, to begin replacing many of its scholarship awards with loan repayment contracts.[32]

Bonuses and salary supplements are widely used across sectors for recruitment—as an additional incentive for talented candidates to take a position—and for retention, to entice a current employee to stay for an additional length of time.

- **Effectiveness.** While the use of bonuses and salary supplements is widespread across sectors, the majority of quantitative research on their effectiveness in filling hard-to-staff positions comes from branches of the U.S. military, which have offered various forms of signing and reenlistment bonuses and contingent salary supplements for decades.[33] The evidence from across branches—the Army, Navy, Marines, and Air Force—overwhelmingly suggests that these incentives can be highly effective in both recruiting and retaining candidates in shortage areas and undesirable or dangerous positions.[34]

- **Advantages over other forms of pay.** Our interviews suggest that the advantage of bonuses and salary supplements over other types of incentives lies primarily in their flexibility—they can be shifted quickly from one position to another if needs change.

Bonuses and salary supplements are also highly visible and relatively easy to understand. Cross-sector experience suggests that any portion of monetary compensation that is not included in base salary—a scholarship or loan repayment check, for example—can easily get "lost" in the apparent total pay package that informs a candidate's or employee's decisions. These incentives cannot have their intended effect on recruitment or retention if the amount of the award isn't clear. But bonuses, in large part due to their size, are easier for candidates to understand as part of the total package. Saul Pleeter, deputy director of the congressionally mandated *Quadrennial Review of Military Compensation*, explains that "when we start giving candidates lots of non-cash benefits, it can become difficult for them to understand what they have. Bonuses, on the other hand, are easy to understand. Candidates can readily translate a $30,000 bonus into a new car or a down payment on a house."

- **Lump sums versus installments.** Incentives can be one-time payments or distributed over the course of several months or even years. There is some evidence from the military that one-time payments can be more cost effective than installments for encouraging reenlistment.[35] Hosek and Peterson (1985) found that a large one-time reenlistment bonus was more attractive to Air Force employees than smaller, delayed payments, with many more signing up for the lump-sum payment—even if it bound them to a longer contractual term.[36]

The disadvantage of lump-sum distribution, of course, is what to do with candidates who do not fulfill the terms of service typically required in exchange. Across sectors, many employers have chosen installment payments over one-time distributions, paying out incentives at the end of the employee's commitment or over the course of a year or more. This encourages retention and helps avoid the unfortunate responsibility of tracking down funds from employees who leave the position after a few weeks or even a year.[37]

Large up-front payments are arguably best for encouraging a candidate to join an organization, or to induce an employee to make a specific decision to stay or return; installment payments are most effective for ongoing retention (and often ease of administration). An employer with an unlimited budget might choose to implement both types, paying a large installment up front and smaller distributions over the course of a year or five years. But those with fixed resources face a tradeoff, and must prioritize the most important goal.

Performance-based incentives. In the broad compensation literature, cross-sector evidence strongly suggests that adding a performance-based pay component to compensation consistently attracts and retains higher performers.[38] And the larger the incentive pay opportunity available for a job, the higher its attraction for high performers.[39] The research on hard-to-staff situations does not explicitly link performance pay with hard-to-staff incentives, but the strong recruitment effects of a performance-based system would likely also apply to hard-to-staff positions in education. As in all uses of performance pay, these effects will be greatest if schools and districts find meaningful ways to define and measure performance.

In the context of employee *performance*, it is important to point out that both the military and civil service—public and regulated, much like education—share an important characteristic that underlies much of the research on hard-to-staff pay: Both have a series of safety nets and built-in systems that are designed to influence the quality of their workforce. In the military, for example, only candidates who obtain an adequate score on the Armed Services Vocational Aptitude Battery—which has been scientifically validated as a predictor of future performance—are eligible to join the service. Officers and enlisted members undergo regular performance evaluations and may be demoted or terminated if their performance doesn't meet standards.

An individual's pay rises not just with years of experience, but with promotions to higher ranks and pay grades—promotions that are based on a complex performance evaluation system. Federal agencies use a similar system, and some have also integrated pay-for-performance on top or in place of the General Schedule. Incentives for hard-to-staff positions in these sectors, then, are designed primarily to increase the candidate pool—quality checks lie elsewhere. (However, in the most recent *Quadrennial Review of Military Compensation*, defense leaders noted that because incentive pays in the military are generally flat sums not linked to performance, they "do not provide sufficient incentives to motivate personnel to top performance").[40]

A larger candidate pool in theory can increase the likelihood that an organization will be able to select higher-quality candidates to fill its highest-need areas. But by themselves, even the most targeted incentives will not guarantee that the organization is hiring employees who are more likely to be effective. Without similar checks in place to influence quality in education—entrance standards that are tied to effectiveness, meaningful evaluations, selective retention—ultimately these incentives will serve only to increase the pool of teacher candidates or shuffle the same teachers from school to school.

How much is enough?

The cross-sector research and our interviews suggest that the optimal amount of recruitment and retention incentives in hard-to-staff positions depends primarily on the *reason* for the shortage. Market-based shortages—positions that are difficult to fill because candidates' training or skill is in high demand—are likely to require a different incentive premium than "disamenity" shortages, or positions that are difficult to fill because working conditions are very challenging or undesirable.

Market-based shortages. Across industries, particular positions routinely command higher salaries because too few high-quality candidates with the required skills are entering the labor pool, alternative careers that require similar skills offer better pay, or both. In education, math, and science, teachers have long been in high demand, largely because these candidates have many competing opportunities outside of education that offer higher pay. Outside of education, engineers and information technology specialists have been in similarly short supply across sectors since the computer boom. Demand for their skills has outpaced the number of trained graduates in these fields.[41]

Research and interviews from across sectors bolster the common-sense notion that for these types of market-based shortages, recruitment and retention incentives must be informed by comparable salaries in other sectors. The incentives must be set at levels high enough to make up the current market value for candidates in these fields. In branches of the U.S. military, for example, starting salaries for high-demand positions are typically set at the 70th to 80th percentile of comparable private-sector occupations. This means that candidates who enter high-demand fields in the military are guaranteed a higher starting salary than their civilian counterparts.[42]

In the military, "comparable" professions for any given position are determined largely by the jobs that qualified candidates are taking instead of entering the military, and the positions that they take when they leave. This method of comparison avoids abstract comparisons to professions that require similar skills or training (the dominant method in public education[43]) to focus on how much real-time competitors pay their starting candidates and to inform an effective market-based response.

In shortage areas such as science and math, the significant amount of additional pay needed to compete with salaries in the private sector—together with shifts in demand for particular positions—may make flexible forms of pay, such as bonuses or loan repayment programs, more feasible and attractive options in education. These types of compensation enable state and district leaders to target resources to shortage areas without across-the-board increases or a long-term commitment when the market for particular positions, and competing opportunities outside education, are likely to change.[44]

Disamenity shortages. For positions that involve "disamenities" such as difficult or dangerous working conditions, remote locations, or lack of strong leadership, the cross-sector research offers policymakers less guidance to determine the optimal amount of recruitment or retention incentives. In the medical field, researchers have suggested that payments should be based primarily on the average amount of debt carried by incoming candidates, with estimates ranging between $10,000 and $20,000 per year to recruit physicians to underserved areas.[45] In the military, recruitment and retention incentives have been set based in part on research showing that every $1,000 in additional incentives yields increases between 0.6 percent and 1 percent in retention in hard-to-staff fields.[46]

None of these findings from the cross-sector research offer a concrete formula for determining the most effective amount of hard-to-staff incentives in any industry. From an economic standpoint, the amount of additional incentives for "tough" or undesirable positions in any sector should be based on an assigned value of the perceived drawbacks of the position, which is the monetary value that candidates would assign to a remote location, for example, or lack of strong leadership. In practice, of course, it is very difficult to accurately assess the value of these characteristics, and even if estimates were readily available, individual perceptions would likely differ widely among candidates.[47]

What the research and experience across sectors do provide is strong evidence that, as a whole, employers in other sectors often provide much larger incentives than the majority of hard-to-staff pay programs currently used in education. A 2001 analysis of hard-to-staff incentives in education found that they comprised only a negligible portion of overall teacher pay.[48] But in the military, for example, special incentives, including recruitment and retention bonuses and education awards, make up 7 percent of total cash compensation.[49] In 2005 (the most recent data available), the average award comprised 10 percent of cash compensation for the military service members who received them.

But the $5,089 average payment in the military masks the great range of amounts among different types of incentives. Signing bonuses for enlisted members can be up to $40,000; members who serve in especially dangerous positions can earn an extra $9,000 per year; and officers in critical shortage areas can expect signing bonuses of up to $60,000. Recent surveys in the private sector have found that special incentives make up a similar percentage of employees' compensation, ranging between 6 percent and 15 percent of their base pay.[50] In the federal civil service, incentives can be up to 25 percent of a candidate or employee's pay. In 2007, recruitment incentives in the federal agencies averaged $7,454, with individual incentives for new recruits ranging between $3,727 and $21,954.[51]

In education, dedicating comparable portions of compensation to hard-to-staff incentives would mean that teachers would earn on average between $4,440 and $11,100 in additional compensation for starting or staying in hard-to-staff positions.[52]

The table below provides additional averages and examples of incentives across sectors.

Ultimately, an incentive of any amount is likely to have an impact on candidates' decisions to take difficult job assignments.[58] But very small incentives—such as 5 percent or less of a candidate's base salary—may not be worth the administrative cost or political fight to put them into place.[59] Our interviews augment the available research to suggest that the most practical approach is for leaders to begin with a reasonably large incentive but remain flexible enough to increase the amount in the next year if it does not prove successful. Saul Pleeter, deputy director of the *Tenth Quadrennial Review of Military Compensation*, explains that "ideally we would have a formula, but in reality we're more flexible. If we start with $10,000 and don't get enough new recruits, we might offer $20,000 or $30,000 until we start to see it pay off. In our experience, you can get reasonably close to the ideal amount in a short period of time."

Capitalizing on differences in individual perceptions of disamenities. The question of "how much" additional money is required to entice a person to take a hard-to-staff job varies by individual, as noted earlier. The cross-sector experience illustrates different ways that employers have capitalized on these differences to get more value out of limited hard-to-staff pay dollars. For example, since 2003, the Navy has assigned specific values to the varying perceptions among its service members through use of an auction system that allows interested sailors to bid the amount of additional pay they would require to accept a particular position. Because of the variety of service members' preferences and interests, the amount of additional pay that they request varies significantly. One military analysis estimates that annual savings from converting all hard-to-staff positions in the Navy to a similar auction system would total more than $100 million.[60] And as we discuss in more

Field	Program	Average amount (annual)	Other notes
Military[53]	Special & Incentive Payments	$5,089	Incentives averaged 10 percent of cash compensation in 2005.
Civil service[54]	Recruitment and Retention Bonuses	$8,517	Incentives can be up to 25 percent of employees' total pay. In 2007, amounts ranged between $3,727 and $21,954.
	Student Loan Repayment Program	$6,245	
Medicine	West Virginia State Loan Repayment Program[55]	$22,500	Loan repayment amounts in this WV study ranged between $10,000 and $25,000.
	Ontario Underserviced Area Program[56]	$10,000	Loan repayment for up to four years.
	Georgia State Medical Education Board Scholarship Program[57]	$10,000	Loan repayment for up to four years.

detail below, differences in individual perceptions about job characteristics also open up an opportunity for employers to pay smaller premiums for disamenities by targeting recruitment toward candidates who are less concerned about or even attracted to certain job characteristics.

Competitive starting pay. In each of the sectors we studied, financial incentives for hard-to-staff positions are layered on top of a starting salary that is fundamentally competitive with candidates' job opportunities in other industries or organizations. Evidence from the medical field, for example, suggests that even without special incentives physicians in rural areas typically earn salaries on par with their counterparts in urban areas. Therefore, the additional incentives provided through physician loan repayment programs are designed to compensate for the perceived "disamenity" of a rural location, and not for a lower starting salary. In cases where physicians do not receive comparable salaries (due to a high number of patients on Medicare, for example) some experts have suggested that incentives in addition to typical loan repayment programs may be required.[61] The same is true in the military, where base pay typically starts in the 70th to 80th percentile of comparable civilian jobs.[62] Special incentives for high-demand positions or dangerous jobs are designed in response to the job market and the disamenities of particular positions. They are not used to bring military jobs into range with comparable professions.

The competitiveness of teacher pay relative to compensation in other similar jobs continues to be the subject of lively debate.[63] A non-competitive starting salary in any sector does not necessarily mean that financial incentives for hard-to-staff positions will not be effective. But to the extent that salaries in education fail to keep pace with compensation in "competing" professions—those to which potential teaching candidates flock after college—the effectiveness of these special incentives may be diminished, or the amounts required to make them effective may be much larger.

Who should determine which units are hard to staff and distribute incentives to candidates and employees?

Across sectors, policymakers and managers have struggled to determine which level of an organization is best suited to determine which of its "units" are hard to staff, and who should have authority over the distribution of incentives to new recruits or current employees. Research and experience across sectors suggests that in most cases no one level is best suited for both.

Determining which units are hard to staff. Evidence from the private, public, and military sectors suggests that decisions about which particular units are hard to staff may best be made at the top of an organization.[64] Ultimately, compensation policies must be informed by an organization's mission and its values. Top leaders who have a strong vision of the organization's goals are often in the best position to make determinations about the units that deserve first priority.

When these decisions are made at the top, they can also help reduce competition for limited funds among departments, offices, or positions, each of which will inevitably believe its shortages are worse than others. As Saul Pleeter explains, "within any organization, there will be competing interests. The people in charge of Army helicopter pilots, for example, will think their staffing problems are more pressing than those in any other branch or position. Having well-informed congressional oversight on the issue helps set incentives based on a bigger picture."

Distributing the incentives to candidates and employees. Though initial decisions about overall staffing needs may best be made at the top of an organization, cross-sector research and experience suggests that it is critical for leaders to enable the managers who work most closely with new candidates and staff to decide how the incentives will be distributed to candidates and employees.[65] Top leaders may set broad ranges of incentive amounts. In the civil service, for example, Congress has set several incentives to be awarded in amounts "up to 25 percent" of a candidate's base pay.[66] But flexibility over the specific amount of the incentive appears critical to enable managers to respond to changes in the external environment, individual work requirements, and rapidly changing market conditions. As defense leaders noted in the most recent comprehensive review of military compensation, "providing the Services with the flexibility to modify the allocation of funds within an [incentive] category ensures that those resources are used in a way that reflects the latest supply and demand conditions."[67]

Managers who are responsible for working with and overseeing the employees who receive the incentives are the best positioned to distribute the incentives. The managers are the most likely to have both the information and the motivation to accurately determine what is required based on changing circumstances."[68] Delegating responsibility for distribution of hard-to-staff incentives at the local level may offer the additional advantage of minimizing administrative burdens upon managers who do not have to obtain explicit approval to distribute each award.

A specific example from the civil service sector illustrates the importance of on-the-ground decision making. In 1999, the U.S. Office of Personnel Management, or OPM, surveyed federal agencies about the agencies' use of recruitment, relocation, and retention incentives for hard-to-staff positions. Agencies reported widespread use of both bonuses and loan repayment, but OPM found that the incentives did not approach the limits that had been allocated by Congress. Agency managers reported that because the authority to approve distribution of the incentives resided at high levels of the hierarchy, the burden of obtaining the go-ahead discouraged them from requesting more.[69]

In education, decisions by top-level leaders may occur in state departments of education or in local school districts, as they determine the schools in which highly effective teachers are in shortest supply. In either case, cross-sector experience suggests that it is critical for policymakers to build in sufficient flexibility for leaders at the local level—district superintendents and building principals—to respond to market pressures for particular positions and distribute the incentives in ways that respond quickly and accurately to changes in local supply.

What other strategies arise from cross-sector experience?

Nearly every industry has experience with hard-to-staff positions that are caused by undesirable characteristics of a particular job, such as a remote location, dangerous working conditions, or other factors. In most cases, organizations across sectors are using financial incentives to help mitigate these shortages. But many are also dedicating significant effort to non-financial solutions at the same time. Some of these are explicitly addressed in the research, but the majority are more implicit—characteristics of "business as usual" that nonetheless are likely to offer important lessons for hard-to-staff pay programs in public education.

Targeting a ready pool. Alongside financial incentives to fill hard-to-staff positions, successful organizations across sectors work to find candidates who already value certain aspects of the hard-to-fill job or who do not perceive the undesirable characteristics as drawbacks. As decades of economics research on compensating differentials has shown, most labor pools are relatively heterogeneous when it comes to candidates' values and preferences for particular aspects of a job. Some candidates may not mind remote locations, for example, and others may be drawn to a challenging or dangerous post.[70] Employers can take advantage of this heterogeneity by using an auction system, as in the Navy, or by seeking out a more ready candidate pool whose members will require smaller incentives—or none at all—to take otherwise undesirable positions.[71]

This heterogeneity in the labor pool may explain why researchers have found in education that an additional $1,000 incentive for teachers may lead to a 3 percent increase in retention at many schools, but the same $1,000 can increase retention at a high-risk school by more than 6 percent.[72] It also helps explain why Teach For America has succeeded in recruiting more than 20,000 new teachers in hard-to-staff schools across the country without the use of financial incentives. TFA offers other incentives, of course, including an increasingly prestigious resumé item and access to a growing network of top-tier young college graduates. But it also attracts corps members by targeting those who find the idea of working in high-poverty schools attractive.

Finding non-personnel solutions. In addition to offering financial incentives and seeking out pools of ready candidates, employers in other sectors are also likely to rethink the nature of hard-to-staff positions entirely. If a particular position is chronically difficult to fill—especially due to disamenities that come with the job—successful organizations in other sectors will reorganize operations, often using new technologies, to eliminate the disamenity or the need for the position entirely. If the drawback of a particular position is working in a remote area, for example, an organization might try to enable its employees to conduct the work from a more central location. More radically, organizations routinely figure out how to use technology to do some of the work that employees used to do, which reduces the number of talented people that are needed in hard-to-staff positions.

Translating these particular strategies from other sectors into education is not clear-cut. But the widespread use of tactics in addition to financial incentives in other industries underscores the need for education leaders to consider parallel solutions to staffing shortages and severe inequities of talent within districts. Especially if predictions about an insufficient number of highly effective teachers prove true in the coming years, public education will need more than one solution to address its staffing and distribution challenges.

Implications for public education

The available research about and the rich base of experience with hard-to-staff pay programs in other sectors offer preliminary guidance for policymakers in designing compensation to address the distribution and quality of public school teachers. The strongest lessons from across sectors raise several implications that we hope will guide education leaders' future decision making.

A portfolio of incentives, including rewards for performance. Because the success of any incentive program depends largely upon the degree to which it is tailored to meet the specific needs of candidates and current employees, a combination of education loans, recruitment bonuses, retention bonuses, performance bonuses, and other types of incentives may best ensure that they are attractive to a variety of new candidates and current teachers. Policymakers in education might consider offering candidates and faculty in hard-to-staff positions a choice about the form of their incentive. They may allow faculty and candidates to receive a loan repayment check, one-time bonus, performance bonus, or other type of payment up to a preset amount. Federal, state, and local education leaders must also pay attention to the factors of these pay plans that influence (or fail to influence) teacher quality. Given the strong research base suggesting that performance-based elements can themselves draw candidates of a higher caliber, one option for education leaders is to tie hard-to-staff incentives to teachers' effectiveness in the classroom. This strategy could be achieved through a combination of team and individual awards based on student progress on standardized assessments, alternative school-administered assessments of student progress, or other indicators of teachers' contribution. Providing rewards for performance could serve as an incentive for candidates who believe that they will succeed in these venues, thereby increasing the quality of the candidate pool and potentially its size.

Substantial premiums. While the cross-sector research does not provide a preset formula for determining the most effective amount of hard-to-staff incentives, it does provide clear evidence that organizations outside of education are providing much larger incentives than the majority of hard-to-staff pay programs currently in place for teachers. In education, incentives closer to 10 percent or 30 percent of a teacher's salary would be more in line with these other sectors' experience than the smaller incentives common in current pay reforms.

Are incentives this large worth the cost? There is no simple way to answer this question. If incentives successfully reduce attrition in hard-to-staff positions, they would presumably save some of the funds currently spent replacing teachers who leave the profession (over $2 billion annually by some estimates).[73] The value of improved student learning in affected classrooms is more difficult to quantify in dollar terms. As knowledge accumulates about the effects of incentives upon student learning, policymakers will be more able to compare them with other interventions based on the benefits they generate per dollar.

Discretion over distribution and amounts. It is clear that initial decisions about which schools are hard to staff should be made at the state or district level, to allow these leaders to prioritize staffing shortages across broad areas. But the cross-sector experience reveals a continuing debate about which levels of an organization are best suited to set individual incentive amounts and oversee distribution. Managers who work most closely with new candidates and staff should have significant flexibility in distributing the incentives and determining their specific amount, preferably in consultation with individual candidates and teachers. But education leaders will likely need to continue experiments with different levels of discretion, giving districts and school leaders varying levels of authority over decisions about which specific subject areas have the shortest supply of effective teachers, and closely monitoring the results.

Targeted recruiting. Alongside special incentives to address hard-to-staff positions, education leaders should invest in targeted recruitment for candidates who are inherently attracted to the conditions that make some schools harder to staff and so require less differentiation in pay. The result would be more "bang for the buck" from the limited budgets for hard-to-staff incentives. Auctions for hard-to-staff positions, as used in the Navy, are one strategy to identify candidates who would require a lesser premium—or none at all—to take on a tough position. Using this strategy, states (or potentially districts) could identify a set of hard-to-staff schools or positions and then conduct an auction in which eligible teacher candidates bid for the positions using the premium that they would require above the normal salary to take the job. High bids would be constrained by overall budget limitations, and qualified candidates with the lowest bids would earn contracts. These auctions could also incorporate a performance-based element by enabling candidates to indicate what percentage of the additional incentive they would be willing to place "at risk" based on their performance.

But auctions are only one way to target recruitment in ways that stretch limited hard-to-staff pay budgets. "Grow your own" programs are another solution for hard-to-staff schools in remote or rural areas, and recruiting graduates who have shown a commitment to public service or increasing the number of mid-career professionals are other possibilities.

Strategies that don't rely on personnel. Education leaders should also consider new ways to provide instruction to students—potentially in all schools but particularly in hard-to-staff locations—and to put technology to use on some of the work that teachers currently do. These strategies sound radical in education but in other industries certainly would have been put on the table long ago. In its basic form, this might include delivering programmed instruction in hard-to-staff subjects, such as math, online. It also might include bringing the job to the people rather than the people to the job in hard-to-staff locations: Excellent content instructors can be located anywhere if their interactions with students occur through a combination of video, audio, and online technologies. Teachers could work from their homes, or from an office where they could be part of a workplace full of other remote instructors engaging in team planning and feedback and receiving ongoing professional development. These venues might prove attractive to a whole range of high-potential teaching candidates who might never consider moving to or working in a hard-to-staff location in the conventional teaching role. Strategies like these would require fundamental changes in how schools work. But like organizations in other sectors faced with staffing challenges, public education needs to begin experimenting with these parallel strategies to recruit and retain individuals in chronically hard-to-fill positions.

Opposition from employees and other stakeholders. In fields where salaries have long been determined using structured and regulated pay scales—such as the military, civil service, and education—introducing incentives that depart from or add to the set salary schedule often raise questions of fairness and equity among employees. The cross-sector research includes discussion of these types of challenges but offers few solutions.[74] Ultimately, compensation that departs from traditional pay scales inherently involves paying some candidates or employees more than others even when they hold a similar position or have identical length of service. This practice may require a major philosophical shift among leaders and employees who are accustomed to steps and lanes. It is not difficult to imagine animosity among colleagues in schools where only a handful of teachers, such as those who work in a high-demand subject such as math or science, receive financial incentives that their peers in English or history do not—even if the incentives respond to very real market pressures. Similarly, providing recruitment incentives only to new teachers who agree to work in a hard-to-staff school could spark understandable resentment if veteran teachers at the same school do not receive similar awards.

Indeed, research from within education suggests that many teachers and state and district leaders hold very skeptical views of compensation that is differentiated by factors other than training or experience.[75] But the research also suggests that incentives for hard-to-staff positions are the least controversial type.[76] In a recent survey of public school teachers by the nonpartisan research firm Public Agenda, 70 percent of teachers said they would support additional financial incentives for teachers in low-performing schools. Forty-two percent would support additional incentives for teachers in hard-to-staff subject areas such as math and science.[77] In their review of 11 hard-to-staff pay plans, Kowal et al (2007) also found that these plans often caused much less political opposition than local leaders expected. Many groups that opposed differentiated pay in principle still supported incentives for teachers in hard-to-staff schools and subject areas. These groups recognized the persistent teaching shortages and saw better allocation of teaching talent as an essential strategy to improve student achievement.[78]

Widespread opposition and political compromise will be inevitable in many states and districts across the country that implement hard-to-staff pay plans, but increased financial support and accountability may make the process a bit easier. Ultimately, education leaders will have little choice but to implement systems that respond to real differences in demand for particular positions and the quality of teachers' work environments. They will need to take such steps to meet the demands of No Child Left Behind and contribute to increases in student learning.

Conclusion

A fundamental characteristic of special incentives for hard-to-staff positions is that they enable organizations to maintain and add on to their existing pay structure, which is why experience from the civil service and U.S. military is particularly instructive for public education. But this is both an advantage for policymakers and a serious drawback in education. The advantage of special incentives lies partly in their feasibility, both in terms of political realities and ease of administration. Adding relatively small incentives on top of the existing salary schedule requires much less effort and compromise than revamping the compensation structure entirely.

Nonetheless, these incentives still involve little more than tinkering around the edges of compensation reform. As mentioned above, without recognition for performance, incentives alone are unlikely to substantially increase the quality of the teacher pool. Schools and districts may have more candidates to choose from, but they won't necessary bring the requisite skills to increase student learning. And they leave the great majority of personnel expenditures in public education tied up in steps and lanes that are only weakly related to teacher quality.

Fortunately, research within education and across sectors is beginning to provide greater guidance for policymakers, so that future experiments with pay reform can increasingly be informed by what works and doesn't work in education. Though too few states and districts have data systems that enable them to track individual teachers' contributions to student learning, recent improvements mean that student-centered performance evaluations are possible for an increasing number of schools. The lessons collected here from the significant experience with hard-to-staff pay outside of education will, we hope, help inform policymakers' future designs of hard-to-staff incentives.

As they implement and redesign these compensation plans, policymakers in education can benefit from lessons learned from decades of differentiated pay in the military, civil service, medicine, and private industry sectors where hard-to-staff pay incentives are a given. Experience from organizations in these sectors suggests that a variety of types of incentives will be required to appeal to a diverse candidate pool and teaching staff, including recruitment and retention bonuses, loan relief, and performance-based inducements. Amounts will likely need to approach 12 percent to 30 percent of a teacher's base salary. And setting broad policies about hard-to-staff pay at a high level while giving district and school officials discretion about allocation is likely the best way to learn what kind of portfolios will be most effective and how high premiums need to be in order to attract a top-notch pool.

At the same time, states and districts should experiment with efforts to stretch limited budgets to fill hard-to-staff slots by pursuing candidates who are naturally drawn in by the difficult aspects of the job, or by auctioning off hard-to-staff positions. Parallel efforts should also include non-financial strategies used by managers across sectors, including technological solutions for positions in remote locations. We know that these strategies have been successful in other sectors. In education, more aggressive state and district efforts in each of these areas, alongside ongoing and independent evaluation of new programs, will be the best way to gain better evidence of "what works" to address the serious maldistribution of teaching talent in our nation's hard-to-staff subject areas and schools.

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