

Part 2 – Stretching the Truth, Not Dollars

Considering the Application of Cost-Benefit Analysis to Teacher Layoff Alternatives

Bruce Baker

Associate Professor

Department of Educational Theory, Policy and Administration
Rutgers, The State University of New Jersey

Bruce.baker@gse.rutgers.edu

If you're running a school district or a private school and you are deciding on what to keep in your budget and what to discard, you are making trade-offs. You are making trade-offs as to whether you want to spend money on X or on Y, or perhaps a more complicated mix of many options. How you come to your decision depends on a number of factors:

1. The **cost** – the total costs of the various ingredients that go into providing X and providing Y. That is, how many people, at what salary and benefits, how much space at what overhead cost (per time used), and how much stuff (materials, supplies and equipment) and at what market prices?
2. The **benefits** – the potential dollar return to doing X versus doing Y. For example, how much dollar savings might be generated in operating cost savings from reorganizing our staffing and use of space, if we spend up front (capital expenses) to reorganize and consolidate our elementary schools where they have become significantly imbalanced over time?
3. The **effects** – the relative effectiveness of doing X versus doing Y. For example, in the simplest case, if we are choosing between two reading programs, what are the reading achievement gains, or effects, from each program? Or, more pertinent to the current conversation (but far more complex to estimate), what are the relative effects of reducing class size by 2 students when compared to keeping a “high quality” teacher?
4. The **utility** – The utility of each option refers to the extent that the option in question addresses a preferred outcome goal. Utility is about preferences, or tastes. For example, in the current accountability context, one might be pressured to place greater “utility” on improving math or reading outcomes in grades 3 through 8. If the costs of a preferred program are comparable to the costs of a less preferred program... well... the preferred program wins. There are many ways to determine what's “preferred,” and more often than not, public input plays a key role especially in smaller, more affluent suburban school districts. As noted above, federal and state policy have played a significant role in defining utility in the past decade (and arguably, distorting resource allocation to a point of significant imbalance in resource-constrained districts).

This basic cost analysis framework laid out by Henry Levin back in 1983 and revisited by Levin and McEwan¹ since should provide the basis for important trade-off decisions in school budgeting and should provide the conceptual basis for arguments like those made by Petrilli and Roza in their recent policy brief on *Stretching the School Dollar*. But such a framework is noticeably absent and likely so because most of the proposals made by Petrilli and Roza:

1. are not sufficiently precise to apply such a framework largely because little is known about the likely outcomes (which may in fact be quite harmful); and
2. because they do not consider in detail the related costs of proposed options, especially up-front costs of many of the options (like school reorganization or developing teacher evaluation systems). Note that the full length book (from which the brief comes) is no more rigorous.

Back of the Napkin Application to Layoff Options

Allow me to provide a back-of-the-napkin example of *some of the pieces* that might go into determining the savings and/or benefits from the primary suggestion made by Petrilli and Roza – which is to use quality based layoffs in place of seniority based layoffs when cutting budgets. This one would seem to be a no-brainer. Clearly, if we layoff based on quality, we'll have better teachers left (greater effectiveness) and we'll have saved a ton money or a ton of teachers. That is, if we are determined to layoff X teachers, it will save more money to lay off more senior, more expensive teachers than to lay off novice teachers. However, that's not the likely what-if scenario. More likely is that we are faced with cutting X% of our staffing budget, so the difference will be in the number of teachers we need to lay off in order to achieve that X%, and the benefit difference might be measured in terms of the change in average class size resulting from laying off teachers by "quality" measures and laying off teachers by seniority.

Let's lay out some of the pieces of this cost benefit analysis to show its complexity.

First of all, let's consider how to evaluate the distribution of the different layoff policies.

Option 1 – Layoffs based on seniority

This one is relatively easy and involves starting from the bottom in terms of experience and laying off as many junior teachers as necessary to achieve 5% savings to our staffing budget.

Option 2 – Layoffs based on quality

Here's the tricky part. Budget cuts and layoffs are here and now. Most districts do not have in place rigorous teacher evaluation systems that would allow them to make high stakes decisions based on teacher quality metrics. AND, existing teacher quality metrics where they do exist (NY, DC, LA) are very problematic. So, on the one hand, if districts rush to immediately implement "quality" based layoffs, districts will likely revert to

¹ http://www.amazon.com/Cost-Effectiveness-Analysis-Methods-Applications-1-Off/dp/0761919341/ref=sr_1_1?ie=UTF8&s=books&qid=1294405852&sr=8-1

relying heavily on some form of student test score driven teacher effectiveness rating, modeled crudely (like the LA Times model).² Recall that even in better models of this type, we are looking at a 35% chance of identifying an average teacher as “bad” and 20% chance of identifying a good teacher as “bad.”³

In general, the good and bad value-added ratings fall somewhat randomly across the experience distribution. So, for simplicity in this example, I will assume that quality based firings are essentially random. That is, they would result in dismissals randomly distributed across the experience range. Arguably, value-added based layoffs are little more than random, given that a) there is huge year to year error even when comparing on the same test and b) there are huge differences when rating teachers using one test, versus using another.

Testing it out with Newark Public Schools

At the very least, one would think that randomly firing our way to a 5% personnel budget cut would create a huge difference when compared to firing our way to a 5% personnel budget cut by eliminating the newest and cheapest teachers. I’m going to run these numbers using salaries only, for illustrative purposes (one can make many fun arguments about how to parse out fixed vs. variable benefits costs, or deferred benefits vs. short run cost differences for pensions and deferred sick pay, etc.).

We start with just over 1,000 elementary classroom teachers in Newark Public Schools, and assume an average class size of 25 for simplicity. The number of teachers is real (at least according to state data) but the class sizes are artificially simplified. We are also assuming all students and classroom space to be interchangeable. A 5% cut is about \$3.7 million. Let’s assume we’ve already done our best to cut elsewhere in the district budget, perhaps more than 5% across other areas, but we are left with the painful reality of cutting 5% from core classroom teachers in grades K-8. In any case, we’re hoping for some dramatic saving here – or at least benefits revealed in terms of keeping class sizes in check.

² <http://schoolfinance101.wordpress.com/2010/12/13/a-few-comments-on-the-gateskane-value-added-study/>

³ <http://schoolfinance101.wordpress.com/2010/07/28/rolldice/>

Figure 1: Staffing Cut Scenarios for Newark Public Schools using 2009-10 Data

Option 1 - Cut 5%		
Total Salaries (Elem. Classroom)		\$ 74,661,971
5% Cut		\$ 3,733,099
Total Kids (assuming class size of 25)		25,950
Total Teachers		1,038
# Teachers Cut by Seniority		72
# Teachers Cut by Random		54
Difference in # of Teachers		18
% Difference (of total)		1.7%
Teachers Left after Seniority Layoff		966
Class Size after Seniority Layoff		26.86
Mean Experience of those Laid Off		13.63
Teachers Left after Random Layoff		984
Class Size after Random Layoff		26.37
Class Size Difference (benefit)		0.49
Mean Experience of those Laid Off		1.80
Option 2 - Layoff 50 Teachers		
Money "Saved" by Laying Off 50 Least Experienced		2,631,191
Money "Saved" by Laying Off 50 Random		3,530,365
Difference in Money Saved (benefit)		899,174
% of Total Salaries		1.2%

Data Source: 2009-10 NJDOE staffing files. Includes only Job Code 1001, or K-8 classroom teachers.

If we layoff only the least experienced teachers to achieve the 5% cut, we layoff only teachers with 3 or fewer years of experience when using the Newark data. The average experience of those laid off is 1.8 years. And we end up laying off 72 teachers (a bad reality no matter how you cut it).

If we use a random number generator to determine layoffs (really, a small difference from using Value-added modeling), we end up laying off only 54 teachers instead of 72. We save 18 teachers, or 1.7% of our elementary classroom teacher workforce.

What's the class size effect of saving these 18 teachers? Well, under the seniority based layoff policy, class size rises from 25 to 26.86. Under the random layoff policy, class size rises from 25

to 26.37. That is, class size is affected by about half a student per class. This may be important, but it still seems like a relatively small effect for a BIG policy change. This option necessarily assumes no downside to the random loss of experienced teachers. Of course, the argument is that more of those classes now have a good teacher in front of them. But again, doing this here and now with the type of information available means relying not even on the “best” of teacher effectiveness models, but relying on expedited, particularly sloppy, not thoroughly vetted models. I would have continued concerns even with richer models, [like those explored in the recent Gates/Kane report](#), which still prove insufficient.⁴

Perhaps most importantly, how does this new policy affect the future teacher workforce in Newark – the desirability for up-and-coming teachers to pursue a teaching career in Newark, where their career might be cut off at any point, by random statistical error? And how does that tradeoff balance with a net difference of about half a student per classroom?

What about other costs?

Petrilli and Roza, among others, ignore entirely any potential downside to the teacher workforce – those who might choose to enter that workforce if school districts or states al-of-the-sudden decide to rely heavily on error prone and biased measures of teacher effectiveness to implement layoff policies. This downside might be counterbalanced by increased salaries, on average and especially on the front end. That is, to achieve equal incoming teacher quality over time, given the new uncertainty, might require higher front end salaries. This cost is ignored entirely (or simply assumed to come from somewhere else, like cutting benefits... negating step increments, or supplements for master’s degrees, each of which have other unmeasured consequences).

I have assumed above that districts would rely heavily on available student testing data, creating error-prone, largely random layoffs, while ignoring the cost of applying the evaluation system to achieve the layoffs. Arguably, even contracting an outside statistician to run the models and identifying the teachers to be laid off would cost another \$50,000 to \$75,000, leading to reduction of at least one more teacher position under the “quality based” layoff model.

And then there are the legal costs of fighting the due process claims that the dismissals were arbitrary and the potential legal daims over racially disparate firings. Forthcoming law review article on this topic to be posted soon.

Alternatively, developing a more rigorous teacher evaluation system that might more legitimately guide layoff policies requires significant up-front costs, ignored entirely in the current overly simplistic, misguided rhetoric.

⁴ <http://schoolfinance101.wordpress.com/2010/12/13/a-few-comments-on-the-gateskane-value-added-study/>

How can we implement quality based layoffs when we're supposed to be laying off teachers NOT teaching math and reading in elementary grades?

Here's another issue that Petrilli, Roza and others seem to totally ignore. They argue that we must a) dismiss teachers based on quality and b) must make sure we don't compromise class sizes in core instructional areas, like reading and math in the elementary grades.

Let's ponder this for a moment. The only teachers to whom we can readily assign (albeit deeply flawed) effectiveness ratings are those teaching math and reading between grades 3 and 8. So, the only teachers who we could conceivably layoff based on commonly proposed (value-added) quality metrics are teachers who are directly responsible for teaching math and reading between grades 3 and 8.

That is, in order to implement quality based layoffs, as reformers suggest, we must be laying off math and reading teachers between grades 3 and 8, except that we are supposed to be laying off other teachers, not those teachers.

Am I saying seniority layoffs are great?

No. Clearly seniority layoffs are imperfect and arguably there is no perfect answer to layoff policies. Layoffs suck and sometimes that sucky option has to be implemented. Sometimes that that sucky option has to be implemented with a blunt and convenient instrument and one that is easily defined, such as years of service. It is foolish to argue that teaching is the only profession where those who've been around for a while – those who've done their time – have greater protection when the axe comes down. Might I suggest that paying one's dues even plays a significant role in many *private sector* jobs? And it is equally foolish to argue that every other profession EXCEPT TEACHING necessarily makes precise quality decisions regarding employees when that axe comes down.

The tradeoff being made in this case is a tradeoff NOT between "keeping quality teachers" versus "keeping old, dead wood" as Petrilli, Roza and others would argue, but rather the tradeoff between laying off teachers on the unfortunately crude basis of seniority only, versus laying off teachers on a marginally-better-than-random, roll-of-the-dice basis. I would argue the latter may actually be more problematic for the future quality of the teaching workforce! Yes, pundits seem to think that destabilizing the teaching workforce can only make it better. How could it possibly get worse, they argue? Substantially increasing the uncertainty of career earnings for teachers can certainly make it worse.

Bad Teachers Hurt Kids, but Salary Cuts Have no Down Side?

The assumption constantly thrown around in these policy briefs is that putting a bad teacher in front of the kids is the worst possible thing you could do. We have to fire those teachers. They are bad for kids. They hurt kids.

But, the same pundits argue that we should cut pay for the teachers in any number of ways (including paying for benefits) and subject teachers to layoff policies that are little more than

random. Since so many teachers are bad teachers, these policies are, of course, not problematic. Right?

I'm having a hard time swallowing that. That's just not a reasonable way to treat a workforce (if you want a good workforce), no less a reasonable way to treat a workforce charged with educating children. In fact, it's bad for the kids, and naive to assert that one can treat the teachers badly, lower their pay, morale and ultimately the quality of the teacher workforce and expect there to be no downside for the kids.

Petrilli and Roza make the assumption that there is big savings to be found from cutting teacher salaries directly and also indirectly by passing along benefits costs to teachers. That's a salary cut! Or at least a cut to the total compensation package and it's a package deal! This argument seems to be coupled with an assumption that there is absolutely no loss of benefit or effectiveness from pursuing this cost-cutting approach (because we'll be firing all of the bad teachers anyway). That is, teacher quality will remain constant even if teacher salaries are cut substantially. A substantial body of research questions that assumption:

- Murnane and Olson (1989) find that salaries affect the decision to enter teaching and the duration of the teaching career;
- Figlio (1997, 2002) and Ferguson (1991) find that higher salaries are associated with better qualified teachers;
- Figlio and Reuben (2001) "find that tax limits systematically reduce the average quality of education majors, as well as new public school teachers in states that have passed these limits;"
- Ondrich, Pas and Yinger (2008) "find that teachers in districts with higher salaries relative to non-teaching salaries in the same county are less likely to leave teaching and that a teacher is less likely to change districts when he or she teaches in a district near the top of the teacher salary distribution in that county."

To mention a few.

That is, in the aggregate, higher salaries (and better working conditions) can attract a stronger teacher workforce, and at a local level, having more competitive teaching salaries compared either to non-teaching jobs in the same labor market or compared to teaching jobs in other districts in the same labor market can help attract and especially retain teachers.

Allegretto, Corcoran and Mishel, among others, have shown that teacher wages have lagged over time – fallen behind non-teaching professions.⁵ AND, they have shown that the benefits differences are smaller than many others argue and certainly do not make up the difference in

⁵ http://www.epi.org/publications/entry/book_teaching_penalty/

the wage deficit over time. I have shown previously on my blog that teacher wages in New Jersey have similarly lagged behind!⁶

So, let's assume we believe that teacher quality necessarily trumps reduced class size, for the same dollar spent. Sadly, this has been a really difficult trade-off to untangle in empirical research and while reformers boldly assume this, the evidence is not clear. But let's accept that assumption. But let's also accept the evidence that overall wages and local wage advantages lead to a stronger teacher workforce.

If that's the case, then the appropriate decision to make at the district level would be to lay off teachers and marginally increase class sizes, while making sure to keep salaries competitive. After all, the aggregate data seem to suggest that over the past few decades we've increased the number of personnel more than we've increased the salaries of those personnel. That is, we should cut numbers of staff before cutting or freezing salaries. In fact, one might even choose to cut more staff and pay even higher salaries to gain competitive advantage in tough economic times. Some have suggested as much. **I'm not sold on that either**, especially when we start talking about increasing class sizes to 30, 35 or even 50. Note that class size may also affect the competitive wage that must be paid to a teacher in order to recruit and retain teachers of constant quality. Nonetheless, it is important to understand the role of teacher compensation in ensuring the overall quality of the teacher workforce and it is absurd to assume no negative consequences of slashing teacher pay across-the-board.

Conclusion

In summary, we should be providing thoughtful decision frameworks for local public school administrators to make cost-effective decisions regarding resource allocation rather than laundry lists of reform strategies for which no thoughtful cost-effectiveness analysis has ever been conducted.

Further, now is not the time to act in panic and haste to adopt these unfounded strategies without appropriate consideration of the up-front costs of making truly effective reforms.

Additional references

Richard J. Murnane and Randall Olsen (1989). The effects of salaries and opportunity costs on length of state in teaching. Evidence from Michigan. *Review of Economics and Statistics*, 71 (2), 347-352

David N. Figlio (1997). Teacher Salaries and Teacher Quality. *Economics Letters*, 55, 267-271.

David N. Figlio (2002). Can Public Schools Buy Better-Qualified Teachers?" *Industrial and Labor Relations Review*, 55, 686-699.

Ronald Ferguson (1991). Paying for Public Education: New Evidence on How and Why Money Matters. *Harvard Journal on Legislation*. 28 (2) 465-498.

⁶ http://schoolfinance101.files.wordpress.com/2010/10/teacher-and-admin-wages_oct2010.pdf

(Figlio (1997, 2002) and Ferguson (1991) find that higher salaries are associated with better qualified teachers.)

Figlio, D.N., Reuben, K. (2001) Tax limits and the qualifications of new teachers. [*Journal of Public Economics*, 80, \(1\) 49-71](#)

Jan Ondrich, Emily Pas, and John Yinger (2008) The Determinants of Teacher Attrition in Upstate New York. *Public Finance Review*, 36 (1), 112-144