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RAYMOND ARTHUR ABBOTT, et al.,

Plaintiffs,

v.

FRED G. BURKE, et al.,

Defendants.

SUPREME COURT OF NEW JERSEY

Docket No.

Civil Action

**CERTIFICATION OF ERIC A.
HANUSHEK, PH.D.**

I, Eric A. Hanushek, Ph.D., of full age, hereby certify
that:

1. The Court has the ability to improve dramatically the
future of children attending schools in New Jersey's most
impoverished cities. This Court and the New Jersey Legislature,
through the SFRA, have established a strong funding framework
for the SDA Districts. However, recent research underscores the
importance of how the funds are spent. As many argue, while a

strong funding base may be necessary, it clearly is not sufficient to ensure high achievement. For this reason, attention has been directed toward decision making that promotes the effective use of available resources. In this regard, this Court can now take action to promote further the improvement of student outcomes in the SDA Districts, the closing of achievement gaps in these districts, and the betterment of student outcomes throughout the State. By ensuring that districts have the ability to allocate resources better through enhanced flexibility, the Court can establish a framework for closing the gaping achievement gaps that remain.

Background Information

2. I am the Paul and Jean Hanna Senior Fellow at Stanford University's Hoover Institution. I have held this position since 2000 and was a Distinguished Visiting Fellow from 1999-2000. I am also currently a Professor (by courtesy) of Education and Economics at Stanford. A true and accurate copy of my C.V. is attached hereto as Exhibit A.

3. I currently hold several other academic positions. I am currently the Chairman of the Executive Board of the Texas Schools Project at the University of Texas at Dallas as well as a Senior Research Fellow at the University of Texas at Dallas. I am also a Research Associate of the National Bureau of Economic Research and a Research Fellow at the Institute for the

Study of Labor (IZA). I am a Research Professor at the Ifo Institute for Economic Research at the University of Munich and Area Coordinator for Economics of Education in the CESifo Research Network. I am a Member of the Council of Academic Advisers at the American Enterprise Institute. I am also a Member of the Management Team of the Center for Analysis of Longitudinal Data in Education Research ("CALDER").

4. I have given major invited lectures at numerous institutions worldwide, including Harvard University, Tufts University, Ohio State University, Michigan State University, Louisiana State University, Georgia State University, the Chinese University in Hong Kong, the University of Tasmania, and Collegio Carlo Alberto.

5. Previously, I was a Member of the Scientific Advisory Council at the Ifo Institute for Economic Research. I was a Professor of Economics and Political Science at the University of Rochester from 1978 through 2000. While at the University of Rochester, I was also the Founding Director of the W. Allen Wallis Institute of Political Economy, a Professor of Public Policy, Senior Research Associate at the Rochester Center for Economic Research, and Chairman of the Department of Economics. In 1994, I was a Visiting Fellow at the Australian National University. From 1975-1978, I was an Associate Professor in the Department of Economics and Institution for Social and Policy

Studies at Yale University. From 1968-1973, I was on the faculty in the Department of Economics at the U.S Airforce Academy, reaching the rank of Associate Professor. From 1970-1971, I was a Research Associate at the J.F. Kennedy School of Government at Harvard University.

6. I have also worked extensively with Federal and State governments. From 2011-2013, I was a Commissioner on the Equity and Excellence Commission of the U.S. Department of Education. Prior to that, I was a Presidential appointee to the Board of Directors of the National Board for Education Sciences and its Chair from 2008-2010. I was Deputy Director for the Congressional Budget Office and also served as the Chairman of its Technical Advisory Panel and a Member of its Panel of Economic Advisors. I was Chair of the NCLB Growth Model Pilot Peer Review for the U.S. Department of Education. I have also been a Member of the NCES Finance Technical Review Committee for the U.S. Department of Education and of the Advisory Council for Education Statistics for the U.S. Department of Education. I have been a Member of the Council of Economic Advisors in California and of the Board of Economic Advisors for the New York State Assembly. From 2005-2008, I was a Member of the Governor's Committee on Education Excellence in California, and in 2007 I was a Member of the Governor's Commission for a College Ready Texas. I have been a Member of the Committee on

National Statistics of the National Academy of Sciences/National Research Council and have chaired several research panels for the National Research Council. I also served as a Consultant for the U.S. Department of Education and U.S. Commission on Civil Rights.

7. I am a Distinguished Graduate of the United States Air Force Academy. I received my Ph.D. in Economics in 1968 from the Massachusetts Institute of Technology where my thesis was entitled "The Education of Negroes and Whites." I also served in the United States Air Force from 1965 through 1974.

8. I am a member of several learned societies, including the American Economic Association, the American Education Finance Association, the Association for Public Policy Analysis and Management, the Econometric Society, the Society of Labor Economists, the American Educational Research Association, and the International Institute of Public Finance.

9. I have received several honors for my work. In 1997, I was named a Fellow of the International Academy of Education. In 2006, I was named a Fellow of the Society of Labor Economists. In 2006, I was named a Member of the National Academy of Education. In 2008, I was named a Fellow of the American Educational Research Association. In 2004, I was awarded the Fordham Price for Excellence in Education (distinguished scholarship).

10. I also have editorial responsibilities at several publications. I am a Co-Editor for CESifo Economic Studies and an Associate Editor for the Journal of Human Capital. I am currently on the Editorial Boards the Journal of Professional Capital and Community, Education Finance and Policy, Education Next, and Economics of Education Review. I have held numerous other editorial positions dating back to 1989.

11. I have also published extensively. I have published more than twenty books. These include three recent co-authored books on the economic outcomes of improved educational performance: "The Knowledge Capital of Nations," "Universal Basic Skills," and "Endangering Prosperity." This year I also co-edited the "Handbook of the Economics of Education," which was the fifth volume of a series first appearing in 2006. In 2009 I co-authored a major book on school finance policy, "Schoolhouses, Courthouses, and Statehouses." My first book published in 1972, "Education and Race," considered how schools affect achievement gaps, a subject of research throughout my career.

12. I have also published hundreds of articles, working papers, notes and comments on a wide range of education-related subjects, including the impact of teacher quality on student achievement, how school districts can identify, attract, and retain high quality teachers, and the economic implications of

improving teacher quality.

13. I have been retained by counsel for the defendant, the New Jersey Department of Education to provide this certification in support of its motion for a modification of the Abbott XX and Abbott XXI Orders. Specifically, I have been retained to opine on the importance and impact of teacher quality on student achievement, on how to identify, attract, and retain high quality teachers in certain New Jersey school districts, known as the "SDA Districts¹," and on the impact that various New Jersey laws and contractual provisions have on SDA districts' abilities to identify, attract and retain high quality teachers.

Statutory and Contractual Provisions

14. I am familiar with N.J.S.A. 18A:6-10, which defendant refers to as the "Tenure Statute", that provides that no teacher with tenure "shall be dismissed or reduced in compensation ... except for inefficiency, incapacity, unbecoming conduct, or other just cause, and then only after a hearing ..."

15. It is my understanding that N.J.S.A. 18A:6-123, which is part of an Act known as the Teacher Effectiveness and Accountability for Children of New Jersey Act ("TEACHNJ") provides that teachers shall be rated annually and placed into

¹ I understand that the "SDA Districts" are thirty-one districts that have been recognized by the State of New Jersey as having special needs. I understand that, prior to the enactment of the School Funding Reform Act of 2008 ("SFRA"), the SDA Districts were known as "Abbott Districts."

one four categories: ineffective, partially ineffective, effective, and highly effective. N.J.S.A. 18A:6-123(b)(1). It is my understanding that, under this statute, the rating mechanism shall be "partially based on multiple objective measures of student learning that use student growth from one year's measure to the next year's measure." N.J.S.A. 18A:6-123(b)(2). I understand that "[s]tandardized assessments shall be used as a measure of student performance but shall not be the predominant factor in the overall evaluation of a teacher." N.J.S.A. 18A:6-123(b)(4). In addition, it is my understanding that the multiple objective measures of student learning shall "be used in conjunction with professional standards of practice using a comprehensive evaluation process in rating effectiveness with specific measures and implementation processes." N.J.S.A. 18A:6-123(b)(4). It is my understanding that "the employee [must] receive multiple observations during the school year which shall be used in evaluating the employee." N.J.S.A. 18A:6-123(b)(7).

16. I understand that N.J.S.A. 18A:6-17.3(a) requires district superintendents to file inefficiency charges against any teacher who receives a rating of less than effective for multiple years.

17. It is my understanding that N.J.S.A. 18A:28-10, which is generally referred to as the "LIFO Statute," provides that in

the event of a reduction in force, dismissals "shall be made on the basis of seniority." Any teacher dismissed in a reduction in force "shall be and remain upon a preferred eligible list in the order of seniority for reemployment whenever a vacancy occurs." N.J.S.A. 18A:28-12.

18. I understand that each of the SDA Districts are subject to Collective Negotiation Agreements ("CNA") with their local teachers' union. The CNA governs virtually every aspect of the District's relationships to their teachers, including teacher salaries, when a teacher may be terminated, teacher evaluations, layoffs in the event of a reduction in force, the length of the school year, the length of the school day, and teacher assignments. For instance, the CNA that is currently applicable in the Camden City School District provides:

- a. "The salaries for all teachers covered by this agreement shall be set forth in the Salary Schedules..." (pg. 21). The referenced salary schedule for 10-month certified teachers takes into account only two considerations: (1) years of experience and (2) education level (Bachelor's degree, Master's degree, Doctorate degree). (pg. 77).
- b. "Any reduction in force shall be carried out according to the following standards for teachers..." (pg. 60). The standards require consideration of first tenured status, second, the length of service and third the level of certification. (pg. 60). Only then, "[i]n the case of all the above factors being equal, teachers will be

considered on the basis of their evaluation ratings..." (pg. 60).

c. "The in-school work year for teachers employed on a ten (10) month basis shall not exceed one hundred and eighty-five (185) days." (pg. 62)

d. "The maximum daily assigned time for all teachers shall not exceed seven (7) hours and five (5) minutes per day." (pg. 64). This includes "a 45-minute unassigned preparation period," (pg. 66), and "an aggregate of 45-minutes of unassigned time that will be scheduled before the start of the school day and/or at the end of the school day." (pg. 66). In addition, on Fridays (or any other day that ends the work week), teachers "shall be allowed to leave five (5) minutes after the students' dismissal time." (pg. 66).

e. With regard to teacher reassignments, the CNA provides that "[a] teacher being involuntarily transferred or reassigned shall not suffer a reduction in rank or in total compensation." (pg. 70). Moreover, "an involuntarily transferred teacher, at the teacher's request, shall have the right to a conference with his/her principal ... and the State Superintendent... prior to the effectuation of the transfer." (pg. 71).

School Funding and Student Achievement

19. It is my understanding that this Court and the New Jersey Legislature, through the SFRA, have established a strong funding framework for the SDA Districts. However, this funding does not include sufficient guidance to ensure that the funds are used well. Current research underscores the importance of how the funds are spent. While a strong funding base may be

necessary, it clearly is not sufficient to ensure high achievement. Thus, in order to meet the goals of the New Jersey Constitution more attention has been directed toward decision making that promotes the effective use of available resources.

20. The Equity and Excellence Commission, a group mandated by the U.S. Congress to analyze the issues of inadequate educational outcomes, reviewed the lengthy history of attempts to improve equity in U.S. schools and concluded: "Despite these efforts and proclamations, large achievement gaps remain, and local finance and governance systems continue to allow for, and in many ways encourage, inequitable and inadequate funding systems and inefficient and ineffective resource utilization." (Equity and Excellence Commission. 2013. *For each and every child: A strategy for education equity and excellence*. Washington, DC: U.S. Department of Education, p. 19) The Commission's emphasis on the need to make better decisions about resource usage summarizes the prevailing views of educational experts.

21. The easiest way to see the difficulty with focusing on just funding levels and not how funding relates to results can be seen by comparisons of funding levels with student performance.

- a. In 2000, expenditure per pupil in the United States was over three times that in 1960 (after adjusting for inflation). And, yet,

pupil performance as measured over the period by the National Assessment of Educational progress, commonly referred to as the "nation's report card," was essentially constant in mathematics and reading. (Hanushek, Eric A. 2006. "School resources." In *Handbook of the Economics of Education*, edited by Eric A. Hanushek and Finis Welch. Amsterdam: North Holland, p. 879-880).

- b. This lack of relationship between spending and student performance holds across countries. Both the levels of country spending and recent increases in country spending are unrelated to student achievement across countries (Hanushek, Eric A., and Ludger Woessmann. 2011. "The economics of international differences in educational achievement." In *Handbook of the Economics of Education, Vol. 3*, edited by Eric A. Hanushek, Stephen Machin, and Ludger Woessmann. Amsterdam: North Holland, p. 127; Hanushek, Eric A., and Ludger Woessmann. 2015. *The knowledge capital of nations: Education and the economics of growth*. Cambridge, MA: MIT Press, p. 188).
- c. The aggregate lack of relationship also holds when statistical techniques are employed to control for other factors that might be influencing achievement. These econometric techniques have analyzed achievement in a wide variety of circumstances and have failed to show a consistent impact of school resources on achievement (Hanushek, Eric A. 2003. "The failure of input-based schooling policies." *Economic Journal* 113, no. 485 (February): F64-F98).
- d. Analyses of performance across districts within individual states similarly show wide dispersion of results for districts spending the same amount per pupil. This lack of correspondence between spending and achievement is found after allowing for

differences in the student populations of districts including the level of preparation students bring to school, the proportion of students who are at risk (economically disadvantaged), who have individual education plans (IEPs) for special education services, and for other potential factors. When spending is plotted against achievement, there is simply a cloud of points instead of the general positive relationship that would occur if just the amount of funds determined outcomes regardless of how funds were used (Costrell, Robert M., Eric A. Hanushek, and Susanna Loeb. 2008. "What Do Cost Functions Tell Us About the Cost of an Adequate Education?" *Peabody Journal of Education* 83, no. 2: 198-223).

- e. Finally, the same picture is found for analysis of student performance in New Jersey, where the significantly increased funds from the Abbott litigation has not led to better performance than seen for other states spending considerably less over time and increasing their funding at a slower rate (Hanushek, Eric A., and Alfred A. Lindseth. 2009. *Schoolhouses, courthouses, and statehouses: Solving the funding-achievement puzzle in America's public schools*. Princeton, NJ: Princeton University Press, Chapter 7).
- f. None of this evidence says the "money does not matter." Of course sufficient funds are necessary to operate schools. It does, however, say that considerably more attention must be given to how resources are used if the overall objectives of schools in terms of student outcomes are to be realized.

The Importance of High Quality Teachers

22. It is my opinion that the most important thing that a school district can do to provide its students with a quality

education is to put its schoolchildren in contact with high quality teachers while eliminating contact with low quality teachers.

23. The importance of employing only high quality teachers, especially in districts with challenges such as those faced in New Jersey's SDA Districts, cannot be overstated. Teacher quality has a decisive impact on SDA District children, the State of New Jersey, and our nation as a whole.

24. There has been rigorous scientific analysis on teachers, schools, and education policy over the past quarter century that has found many traditional beliefs and much conventional thinking on these topics to be incorrect and unjustified. These unsupported traditional beliefs are embedded throughout the laws and regulations governing teachers in New Jersey, and eliminating the impediments presented by the mistaken institutional structure is one of the greatest challenges currently facing New Jersey schools.

25. Literally hundreds of research studies have focused on the importance of teachers for student achievement. Two key findings emerge. First, teachers are very important; no other measured aspect of schools is nearly as important in determining student achievement. Second, it has not been possible to identify any specific characteristics of teachers that are reliably related to student outcomes—a teacher's experience, education,

certification, salary, and training are simply not strongly correlated with student achievement (Hanushek, Eric A., and Steven G. Rivkin. 2004. "How to improve the supply of high quality teachers." In *Brookings Papers on Education Policy 2004*, edited by Diane Ravitch. Washington, DC: Brookings Institution Press: 7-25; Hanushek, Eric A., and Steven G. Rivkin. 2006. "Teacher quality." In *Handbook of the Economics of Education*, Vol. 2, edited by Eric A. Hanushek and Finis Welch. Amsterdam: North Holland: 1051-1078).

26. Despite being unable to measure the specific attributes that make for an effective teacher, academics have conclusively found that teacher effectiveness varies considerably. For example, my research shows that some teachers produce 1.5 years of gain in student achievement in an academic year while others with equivalent characteristics produce only 0.5 years of gain in student achievement. Stated differently, two students starting at the same level of achievement can reach vastly different achievement levels at the end of a single academic year due solely to the teacher to which they are assigned. These different achievement levels have lasting impacts. If a bad year is compounded by other bad years, it may not be possible for the student to recover. But, if good years follow other good years, it is feasible to close existing achievement gaps. (Hanushek, Eric A. 1992. "The trade-off between child quantity and

quality." *Journal of Political Economy* 100, no. 1 (February): 84-117.)

27. Given the importance of teacher quality to student achievement, as well as the inability to identify effective teachers based on distinguishable characteristics, I (and many other academics) have abandoned a focus on "input policies," such as decreasing class sizes and increasing requirements for entry into the teaching profession, in favor of "outcome policies" that focus on identifying and rewarding teachers who are able to increase student learning.

28. A teacher is obviously not the only factor that affects a student's academic achievement. For example, a student's own motivations and support from family and peers (among other things) play crucial roles as well. Nevertheless, teachers are an important determinant of student success irrespective of the student's background or other factors. As a result, researchers have worked hard to isolate the impact of teachers by controlling for these other influences in their measurements of teacher effectiveness.

29. Value-added modeling ("VAM") is one method of measuring teacher effectiveness. VAM involves complicated statistical analysis but has the easily understandable goal of isolating and measuring teacher effectiveness. In general terms, it does this by comparing the current test scores of the teacher's students to

the same students' prior test scores, while simultaneously controlling for various factors (such as ethnicity, socioeconomic qualities, and parental education). These steps are taken in order to ensure that only the teacher's influence on the students is captured (Hanushek, Eric A., and Steven G. Rivkin. 2012. "The distribution of teacher quality and implications for policy." *Annual Review of Economics* 4: 131-157).

30. Rigorous VAM studies consistently show that the impact on students of a more-effective teacher is substantial. A teacher who is one standard deviation above average increases student achievement by 0.2 standard deviations (or approximately 6-8 months of learning) when compared to the average teacher. On the other hand, a teacher who is one standard deviation below average decreases student achievement by 0.2 standard deviations (or approximately 6-8 months of learning). Hanushek, Eric A., and Steven G. Rivkin. 2010. "Generalizations about using value-added measures of teacher quality." *American Economic Review* 100, no. 2 (May): 267-271. (A teacher one standard deviation above the average would be at the eighty-fourth percentile of the distribution of teacher effectiveness.)

31. High levels of student achievement are important for individuals, for the State, and for the Nation. Ineffective teachers handicap the student for life.

- a. The United States has the greatest economic returns to individuals with high skills of any of the 23 developed nations that provide comparable data on economic results. By implication, it is the greatest penalty to individuals with low skills (Hanushek, Eric A., Guido Schwerdt, Simon Wiederhold, and Ludger Woessmann. 2015. "Returns to skills around the world: Evidence from PIAAC." *European Economic Review* 73: 103-130).
- b. If teachers are linked to their students, a clear picture of enormous economic impact emerges. A teacher at the sixtieth percentile of the distribution of teacher effectiveness will on average increase a student's lifetime earnings (in present value terms) by over \$5,000 above what would be obtained with an average teacher. A teacher at the ninetieth percentile will increase the average student's lifetime income by over \$25,000 above that expected for an average teacher (Hanushek, Eric A. 2011. "The economic value of higher teacher quality." *Economics of Education Review* 30, no. 3 (June), p. 473).
- c. The prior calculations apply to the average student in a class, but a teacher simultaneously influences the entire class. Thus, a ninetieth percentile teacher with a class of 25 students will add in total more than \$680,000 in future income to the class. This addition is obtained each year the teacher is in the classroom.
- d. The unfortunate problem is that a tenth percentile teacher will subtract an equivalent amount each year from a class of 25 students as compared to an average teacher.
- e. The huge economic costs of ineffective teachers are supported by the analysis of Raj Chetty, John N. Friedman, and Jonah Rockoff. 2014. Using a very different

methodology that relates the value-added of teachers to the earnings of students observed in the labor market, a similar damaging effect of ineffective teachers is directly observed (Chetty, Raj, John N. Friedman, and Jonah Rockoff. 2014.

"Measuring the impacts of teachers II: Teacher value-added and student outcomes in adulthood." *American Economic Review* 104, no. 9 (September): 2633-2679); see also Koedel, Cory, Kata Mihaly, and Jonah E. Rockoff. 2015. "Value-added modeling: A review." *Economics of Education Review* 47(8//): 180-195.

32. The implications for individual classrooms also apply to the nation. If the nation could over the next 15 years just lift the performance of those students performing "below basic" levels to a basic level, the level of GDP in the United States would according to historical relationships be lifted by 3.3 percent - almost as much as the total national spending on K-12 education (Hanushek, Eric A., and Ludger Woessmann. 2015. *Universal basic skills: What countries stand to gain*. Paris: Organisation for Economic Co-operation and Development, p. 56). These calculations unrealistically assume that nobody above basic skills would be affected by school improvement. But, any school improvement program for the lowest skill group would almost certainly also increase the achievement of students above basic, implying that the economic impacts would be even greater. Improving the average skills of U.S. students to the level of those in Canada would imply even greater impacts with the income of all workers in the economy being raised on average by more than 20 percent compared with what would be expected with no improvement in achievement (Hanushek, Eric A., Paul E. Peterson, and Ludger Woessmann. 2013. *Endangering prosperity: A global view of the American school*. Washington, DC: Brookings Institution Press, p. 12).

33. The research on the economic impacts of improved achievement also indicates that there would be a large impact on achievement in New Jersey if its schools could raise achievement. For example, if New Jersey could bring its students up to the level of students in Minnesota, past economic history suggests that state GDP could be 3.5 percent higher on average over the next 80 years. (Hanushek, Eric A., Jens Ruhose, and Ludger Woessmann. 2016. "It pays to improve school quality: States that boost student achievement could reap large economic gains." *Education Next* 16, no. 3 (Summer): 16-24; Hanushek, Eric A., Jens Ruhose, and Ludger Woessmann. 2015. "Economic Gains for U.S. States from Educational Reform." NBER Working Paper No. 21770. Cambridge, MA: National Bureau of Economic Research (December)). Just bringing all New Jersey students up to the basic level of skills as measured by NAEP would lift average future GDP in New Jersey by over two percent.

34. As summarized by the Equity and Excellence Commission, "Given the many equity challenges facing our schools, none seems more crucial—or more daunting—than the need to improve teachers' capacities to teach all children well and, in particular, to ensure that there is a stable supply of excellent teachers and school leaders in our highest-need schools. To create and retain such a workforce, we must not only have excellent school leadership and an adequate and equitable funding stream to

ensure well-resourced learning environments for every child, but we must also have policies and practices that develop, select and fairly distribute a highly effective teacher workforce to all schools." (Equity and Excellence Commission. 2013. *For each and every child: A strategy for education equity and excellence*. Washington, DC: U.S. Department of Education, p. 21).

How to Evaluate Teacher Quality

35. Research shows that a teacher's years of experience and education level are not accurate indicators of teacher quality (Hanushek, Eric A., and Steven G. Rivkin. 2012. "The distribution of teacher quality and implications for policy." *Annual Review of Economics* 4; Hanushek, Eric A. 2003. "The failure of input-based schooling policies." *Economic Journal* 113, no. 485 (February): F64-F98.).

36. VAM is a reliable predictor of student achievement, though it is only one way of measuring teacher effectiveness. For example, the Measuring Effective Teaching Project ("MET Project") was a very large, multi-year project to develop and test multiple measures of teacher effectiveness in order to improve the quality of information about teacher effectiveness to professionals in the education field. It found that student surveys and high-quality classroom observations are predictive of student achievement as well. The MET Project ultimately concluded that districts should measure teacher effectiveness through a

combination of VAM, student surveys, and classroom observations (Kane, Thomas J., Daniel F. McCaffrey, Trey Miller, and Douglas O. Staiger. 2013. *Have We Identified Effective Teachers? Validating Measures of Effective Teaching Using Random Assignment*. MET Project: Bill and Melinda Gates Foundation (January)).

37. While there is some controversy about the appropriate development and use of VAM, there is a general consensus that value-added measures should be used in personnel decisions along with other evaluative approaches (Koedel, Cory, Kata Mihaly, and Jonah E. Rockoff. 2015. "Value-added modeling: A review." *Economics of Education Review* 47(8//): 180-195.). At the same time, few if any researchers would advocate exclusive use of VAM for teacher evaluation (Hanushek, Eric A. 2016. "School human capital and teacher salary policies." *Journal of Professional Capital and Community* 1, no. 1: 23-40.).

38. The Equity and Excellence Commission concluded "Sound evaluation systems must be based on high standards of practice, and the assessment of teachers must include valid multiple measures of academic growth, evidence from classroom and school practice, and contributions to colleagues and the school community" (Equity and Excellence Commission. 2013. *For each and every child: A strategy for education equity and excellence*. Washington, DC: U.S. Department of Education, p. 24).

39. There is substantial evidence that principals can identify the most effective and the least effective teachers, even if there is some confusion in rankings in the middle of the distribution (Murnane, Richard J. 1975. *Impact of school resources on the learning of inner city children*. Cambridge, MA: Ballinger; Armor, David J., Patricia Conry-Oseguera, Millicent Cox, Niceima King, Lorraine McDonnell, Anthony Pascal, Edward Pauly, and Gail Zellman. 1976. *Analysis of the school preferred reading program in selected Los Angeles minority schools*. Santa Monica, CA: Rand Corp; Jacob, Brian A, and Lars Lefgren. 2008. "Can Principals Identify Effective Teachers? Evidence on Subjective Performance Evaluation in Education." *Journal of Labor Economics* 26, no. 1 (January): 101-136; Kane, Thomas J., Daniel F. McCaffrey, Trey Miller, and Douglas O. Staiger. 2013. *Have We Identified Effective Teachers? Validating Measures of Effective Teaching Using Random Assignment*. MET Project: Bill and Melinda Gates Foundation (January)).

40. An evaluation program using a mixed VAM and observational approach has proven successful. The IMPACT program in Washington, DC, has developed teacher evaluations using VAM and observational approaches. These evaluations are used both to provide rewards for the most effective teachers and to dismiss the most ineffective teachers. The IMPACT system has shown strong impacts on student achievement (Dee, Thomas S., and

James Wyckoff. 2015. "Incentives, selection, and teacher performance: Evidence from IMPACT." *Journal of Policy Analysis and Management* 34, no. 2 (Spring): 267-297).

41. The evidence indicates that it is important to involve principals and to make local decisions about the quality of teachers. This is supported by a variety of studies, and it shows that principals can have a significant impact on school performance through the selection of teachers on the basis of effectiveness (Branch, Gregory F., Eric A. Hanushek, and Steven G. Rivkin. 2013. "School Leaders Matter: Measuring the impact of effective principals." *Education Next* 13, no. 1 (Winter), p. 62-69.; Branch, Gregory F., Eric A. Hanushek, and Steven G. Rivkin. 2012. "Estimating the Effect of Leaders on Public Sector Productivity: The Case of School Principals." NBER Working Paper W17803. Cambridge, MA: National Bureau of Economic Research (January)).

42. The TEACHNJ legislation appears to move in the right direction, but it does not go far enough and it does not permit sufficiently timely decisions.

**School Districts Must Make Personnel Decisions
Based on Teacher Quality**

43. In order to increase student contact with high quality teachers and minimize student contact with low quality teachers, it is my opinion that school districts must have the ability to

make personnel decisions based on teacher quality so that they can disassociate low quality teachers and hire and retain high quality teachers. In the words of the Equity and Excellence Commission, "To ensure that every child receives what he or she needs to succeed in school, we require a systemic means of cutting through the red tape that ties up funding streams and personnel" (Equity and Excellence Commission. 2013. *For each and every child: A strategy for education equity and excellence*. Washington, DC: U.S. Department of Education, p. 34).

44. Research shows that making personnel decisions based solely on teacher experience and education level has significant detrimental effects on teacher and student performance.

45. The clearest evidence is found in analyses of teacher layoff policies. For states such as New Jersey that use seniority methods to decide on layoffs, there are considerable costs to students. Laying off teachers by last-in-first-out (LIFO) policies leads to significant costs in terms of achievement of students (Hanushek, Eric A., and Steven G. Rivkin. 2012. "The distribution of teacher quality and implications for policy." *Annual Review of Economics* 4, p. 152-153). This cost is central to the calculations of Boyd, Donald, Hamilton Lankford, Susanna Loeb, and James Wyckoff. 2011. "Teacher Layoffs: An Empirical Illustration of Seniority versus Measures of Effectiveness." *Education Finance and Policy* 6, no.

3 (Summer), p. 439-454; of Goldhaber, Dan, and Roddy Theobald. 2013. "Managing the Teacher Workforce in Austere Times: The Determinants and Implications of Teacher Layoffs." *Education Finance and Policy* 8, no. 4 (Fall), p. 494-527; and of Goldhaber, Dan, Katharine O. Strunk, Nate Brown, and David S. Knight. 2016. "Lessons Learned From the Great Recession: Layoffs and the RIF-Induced Teacher Shuffle." *Educational Evaluation and Policy Analysis* 38, no. 3 (September): 517-548.

Good Teachers Must be Rewarded

46. In addition to employing and retaining high quality teachers, school districts must also reward high quality teachers. The way to get overall improvements in student achievement is to dismiss the most ineffective teachers and to retain the most effective. To retain the most effective, schools must provide rewards for the best teachers (Dee, Thomas S., and James Wyckoff. 2015. "Incentives, Selection, and Teacher Performance: Evidence from IMPACT." *Journal of Policy Analysis and Management* 34, no. 2: 267-297).

47. They must also ensure good working conditions to make schools attractive (Hanushek, Eric A., and Steven G. Rivkin. 2007. "Pay, working conditions, and teacher quality." *Future of Children* 17, no. 1 (Spring), p. 69-86).

48. Moreover, by cutting down turnover of more senior and more effective teachers, local schools can improve overall

student performance - particularly of schools serving a disadvantaged population (Hanushek, Eric A., Steve G. Rivkin, and Jeffrey C. Schiman. forthcoming. "Dynamic Effects of Teacher Turnover on the Quality of Instruction." *Economics of Education Review*.).

District Administrators Must Have the Flexibility to Manage the District

49. Research shows that school district administrators who have the flexibility to manage their districts in the ways that best suit their students' needs are more successful than districts that lack this flexibility.

50. This is evident in many charter schools, which possess this flexibility and are very successful. Research shows that the success of charter schools can be replicated in traditional public schools, if traditional public schools are given the flexibility to implement the methods used in charter schools. In particular, there is strong evidence that charter schools, which can avoid some of the severe regulatory and contractual restrictions facing the traditional public schools, have quite outperformed the urban public schools in New Jersey (CREDO. 2015. *Urban Charter School Study: Report on 41 Regions*. Stanford, CA: Center for Research on Educational Outcomes).

51. Investigations of the components of charter school success point to a variety of factors. For example, having

flexibility in both the length of the school day and the length of the school year appears from research to lead to important gains in student achievement. (Dobbie, Will, and Roland G. Fryer, Jr. 2013. "Getting beneath the veil of effective schools: Evidence from New York City." *American Economic Journal: Applied Economics* 5, no. 4 (October): 28-60.) Moreover, such policies have been shown to be feasible and valuable when introduced to traditional public schools. (Fryer, Roland G. 2013. "Injecting Successful Charter School Strategies into Traditional Public Schools: A Field Experiment." NBER Working Paper No. 17494. Cambridge, MA: National Bureau of Economic Research (December).) Yet, the SDA districts are frequently barred from considering such changes by their collective negotiation agreements.

52. New programs are difficult to institute because the contractual provisions do not provide sufficient latitude to conduct the required training and professional development. (Certification by Superintendent Rouhanifard). And, at times the introduction of any new program that affects personnel must first be negotiated with the teachers union, a very costly and dampening contractual provision. (Certification of Superintendent Evans)

53. The ability to select and assign teachers where they are most productive is an important managerial tool that is frequently thwarted in large districts where the teacher unions

have introduced various restrictions on assignment. (Anzia, Sarah F., and Terry M. Moe. 2014. "Collective Bargaining, Transfer Rights, and Disadvantaged Schools." *Educational Evaluation and Policy Analysis* 36, no. 1 (March): 83-111). This assignment flexibility is prohibited by contractual provisions that inhibit effective use of resources in the SDA districts.

54. Charter schools also demonstrate that flexibility in hiring, paying, and retaining teachers allows them to ensure an effective teaching force. Hiring and pay flexibility permit attracting specialists and particularly effective teachers.

Statutory Provisions are Impediments

55. It is my opinion that there are certain statutory impediments that, as they are currently being applied in New Jersey's SDA Districts, are impeding the districts' abilities to provide quality education to their schoolchildren. In simplest terms, these provisions make it impossible to use available resources effectively in the SDA Districts.

A. The Tenure Statute

56. The Tenure Statute effectively prevents the SDA Districts from being able to terminate ineffective teachers and therefore harms students by increasing their contact with low quality teachers.

57. In order to terminate an ineffective teacher who has tenure, the Tenure Statute sets forth a complicated procedure,

which requires that an arbitration proceeding take place and places a burden on the school district to prove "just cause" for the termination. N.J.S.A. 18A:6-10. The procedural hurdles also lead to substantial costs in dealing with ineffective teachers.

58. Under the TEACHNJ procedures established in 2012, a teacher must receive less than effective evaluation ratings for at least two years in a row before inefficiency charges may be brought. In order to be rated, the teacher must be in the classroom so that he or she can be observed for at least two consecutive years. If the teacher is not in the classroom, then expansion of the time implies that students will be forced to endure ineffective teachers for a longer period.

59. As discussed herein, research establishes that exposure to low quality teachers has a severe detrimental and long-term impact on students. Just one year of exposure to a low quality teacher lowers a student's lifetime earning capacity. As noted, one year with a tenth percentile teacher costs the average student almost \$27,000 compared to an average teacher. This loss is compounded by having a series of bad

teachers. But, looked at from the other side, the negative impact of an ineffective teacher keeps extracting the same amount of future earnings for each successive classroom (Hanushek, Eric A. 2011. "The economic value of higher teacher quality." *Economics of Education Review* 30, no. 3 (June)).

60. For example, in the 2014/2015 school year, there were 90 teachers rated as "ineffective" in the Newark Public School District. Under TEACHNJ, those teachers must be evaluated two years in a row before charges must be brought against them. Thus, if each ineffective teacher teaches thirty students per year, they must teach sixty students before inefficiency charges can be brought under TEACHNJ. This means that, under the provisions of the Tenure Statute and TEACHNJ, these 90 ineffective teachers in just one district will impact the futures of 5,400 schoolchildren before the process can even be started to fire the teachers. If the process takes years, the importance is even greater.

61. Even if the ineffective teacher's employment is ultimately terminated, there will be a negative impact on thousands of children that will last into their adulthood. If these teachers identified as being ineffective are at the tenth percentile of the teacher quality distribution, the previous calculations of the economic impact indicate that the 90 teachers are expected to cost their students \$144 million in

future income if terminated promptly at the end of two years. (Hanushek, Eric A. 2011. "The economic value of higher teacher quality." *Economics of Education Review* 30, no. 3 (June): 466-479). If termination takes longer, the cost compared to having an average teacher obviously grows. Obviously not all of these costs can be easily avoided, but the impediments to effective management of the teacher force even under TEACHNJ are extraordinarily costly to students who are assigned to the ineffective teachers.

62. It is my opinion that the Tenure Act, as modified by TEACHNJ, harms students because it requires schools to continue to employ known, ineffective teachers and requires these ineffective teachers to be put in contact with students before they can be terminated for inefficiency. In SDA districts, this effect is particularly devastating.

B. The LIFO Statute

63. The LIFO Statute also prevents the SDA Districts from being able to terminate ineffective teachers and, in many cases, also forces the SDA Districts to terminate effective teachers in lieu of ineffective teachers, where there is a reduction in force.

64. Under the LIFO Statute, the terms of which are also incorporated in most CNAs, requires that, in the event of a reduction in force (RIF), school districts must terminate

teachers on the basis of seniority first and qualification (education level) second. Only after all nontenured teachers are released may the school districts consider releasing any tenured teacher. Quality is not considered to setting the schedule of terminations under a RIF.

65. As applied, in the SDA Districts, which I understand employ a relatively large number of ineffective teachers, this results in being required to terminate effective teachers while retaining ineffective teachers in the event of a RIF.

66. For example, in 2015, Camden City School District determined that it was likely going to need to conduct a RIF. (2015 Camden Waiver at 2). Camden's Superintendent determined that, if the RIF occurred during the 2014/2015 school year, 206 teachers would be impacted. Ibid. Under the LIFO Statute, this would result in 164 effective or highly effective teachers being terminated. Ibid. That, that year, Camden employed 147 less than effective teachers. (2014/2015 Teacher Ratings).

67. The SDAs have faced falling student enrolment, implying that they tend to need to reduce the number of teachers and instructional personnel, but they tend to be reluctant to follow RIF procedures because of the potential loss of highly effective teachers.

68. The LIFO statute also affects recruiting. If there is a possibility of a RIF, new teachers will be reluctant to

apply to a district, because they know they will be the first let go - no matter how well they teach.

69. The LIFO rules also imply that the teachers with the lowest salaries are let go first. Thus, for any necessary budgetary adjustment, the LIFO rules maximize the total number of teachers that must be released. This larger than necessary reduction in force leads to more disruption in the schools and particularly harms the schools with the highest concentrations of at-risk students (Hanushek, Eric A., Steve G. Rivkin, and Jeffrey C. Schiman. forthcoming. "Dynamic Effects of Teacher Turnover on the Quality of Instruction." *Economics of Education Review*.)

70. Given the importance of putting students in contact with high quality teachers as opposed to low quality teachers, it is my opinion that the inflexibility of the LIFO statute harms students in SDA Districts by (a) increasing student contact with low quality teachers and (b) decreasing student contact with high quality teachers.

C. Other Impediments to Flexibility

71. State laws, state regulations, and contractual provisions restrict the managerial latitude of the school principal and of the district. For example, restriction on class size are expensive and generally ineffective in terms of raising student achievement (Hanushek, Eric A. 1999. "The

evidence on class size." In *Earning and learning: How schools matter*, edited by Susan E. Mayer and Paul E. Peterson. Washington, DC: Brookings Institution: 131-168). Restrictions on assignment of teachers limits the ability of districts to make best use of teachers (Special interest: Teachers Unions and America's Public Schools, Terry Moe Brookings Institution Press, Washington, DC 2011). Restrictions on the length of the school day or the length of the school year - restrictions not generally applying to charter schools - also limit the options of districts to make effective choices. (Dobbie, Will, and Roland G. Fryer, Jr. 2013. "Getting beneath the veil of effective schools: Evidence from New York City." *American Economic Journal: Applied Economics* 5, no. 4 (October): 28-60.)

72. To reiterate the conclusions from the Equity and Excellence Commission: "Policy details are important, but moral and political determination are vital. We must avoid a future that continues to consign millions of poor children to inadequate schools lacking the great teachers and principals they need" (Equity and Excellence Commission. 2013. *For each and every child: A strategy for education equity and excellence*. Washington, DC: U.S. Department of Education, p. 39).

I hereby certify that the statements made by me are true.
I am aware that if any of the foregoing statements are willfully
false, I am subject to punishment.

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Dated: August 22, 2016

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Education

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| 1965 | B.S. | (Distinguished Graduate) U.S. Air Force Academy |
| 1968 | Ph.D. | (Economics) Massachusetts Institute of Technology Thesis: "The Education of Negroes and Whites" |

Learned Societies

American Economic Association
 American Education Finance Association
 (Board of Directors, 2006-2009)
 Association for Public Policy Analysis and Management
 (Policy Council, 1981-85; vice president, 1986-87; president, 1988-89)
 Econometric Society
 Society of Labor Economists
 (Fellow, 2006-)
 American Educational Research Association
 (Fellow, 2008-)
 International Institute of Public Finance

Honors

Fellow, International Academy of Education, 1997
 (Board of Directors, 2002- 2008)
 Fellow, Society of Labor Economists, 2006
 Member, National Academy of Education, 2006
 Fellow, American Educational Research Association, 2008
 Fordham Prize for Excellence in Education (distinguished scholarship), 2004

Military Service

U.S. Air Force, 1965-74

Academic Experience

- 2000- Paul and Jean Hanna Senior Fellow, Hoover Institution, Stanford University
Professor (by courtesy) of Education (2001-)
Senior Fellow (by courtesy), Stanford Center for International
Development [SCID], Stanford Institute for Economic Policy Research
[SIEPR], (2003-)
Professor (by courtesy) of Economics (2004-)
- 2003- Chairman, Executive Board, Texas Schools Project, University of Texas at
Dallas
- 2000- Senior Research Fellow, University of Texas at Dallas
- 1999- Member, Koret Task Force on K-12 Education, Hoover Institution, Stanford
University
- 1995- Research Associate, National Bureau of Economic Research
- 2006- Research Professor, Ifo Institute for Economic Research (University of
Munich)
- 2013- Research Fellow, Institute for the Study of Labor (IZA)
- 2013- Member, Council of Academic Advisers, American Enterprise Institute
- 2008- Member, Management Team, Center for Analysis of Longitudinal Data in
Education Research (CALDER)
- 2008- Area coordinator, Economics of Education, CESifo Research Network
- 2006-2008 Member, Scientific Advisory Council, Ifo Institute for Economic Research
- 1978-2000 Professor of Economics and Political Science, University of Rochester
Founding Director, W. Allen Wallis Institute of Political Economy (1991-99)
Professor of Public Policy (1992-2000)
Senior Research Associate, Rochester Center for Economic Research
(1984- ; Director, 1994-99)
Chairman, Department of Economics (1982-87; 1988-90; 1991-93)
- 1999-2000 Distinguished Visiting Fellow, Hoover Institution, Stanford University
- 1994 Visiting Fellow, Australian National University
- 1975-78 Associate Professor, Department of Economics and Institution for Social and
Policy Studies, Yale University

- 1974 Lecturer, Virginia Polytechnic Institute (Reston Campus)
- 1968-73 Associate Professor of Economics, U.S. Air Force Academy (Assistant Professor, 1969-71; Instructor, 1968-69)
- 1970-71 Research Associate, J.F. Kennedy School of Government, Harvard University

Government Experience

- 2011-2013 Commissioner, **Equity and Excellence Commission**, U.S. Department of Education
- 2004-2010 Member, Board of Directors, National Board for Education Sciences
Chair, 2008- 2010
- 2008-2010 Member, Council of Economic Advisors, California
- 2007 Member, Governor's Commission for a College Ready Texas, Texas
- 2006 Chair, NCLB Growth Model Pilot Peer Review, U.S. Department of Education
- 2005-2008 Member, **Governor's Committee on Education Excellence**, California
- 2002-2006 Member, Independent Review Panel, National Assessment of Title I, U.S. Department of Education
- 2001-05 Member, NCES Finance Technical Review Committee, U.S. Department of Education
- 2002 Member, Advisory Council on Education Statistics, U.S. Department of Education
- 1994-98 Member, Board of Economic Advisors, New York State Assembly
- 1994-95 Member, Technical Panel on Trends and Issues in Retirement Savings,
Advisory Council on Social Security
- 1987-95 Consultant, U.S. Department of Education
- 1986-89 Consultant, U.S. Commission on Civil Rights
- 1987-89 Chairman, Technical Advisory Panel, Congressional Budget Office
- 1985-87 Member, Panel of Economic Advisers, Congressional Budget Office
- 1983-85 Deputy Director, Congressional Budget Office
- 1974 Systems Analyst, Military Airlift Command, U.S. Air Force

- 1973-74 Senior Economist, Cost of Living Council
- 1971-72 Senior Staff Economist, Council of Economic Advisers

Other Experience

- 2011-15 Director, CollegeSpring (formerly SEE College Prep)
- 2010-15 Member, Education Reform Advisory Group, George W. Bush Institute
- 2010-15 Director, GreatSchools
- 2007-15 Member, Review Board for Broad Prize for Urban Education
- 2000-01 Member, Committee on Scientific Principles of Education Research, National Academy of Sciences/National Research Council
- 2000 Member, Historic Preservation Commission, Town of Brighton, NY
- 1998-2001 Member, Panel on Data and Methods for Measuring the Effects of Changes in Social Welfare Programs, National Academy of Sciences/National Research Council
- 1992-98 Member, Committee on National Statistics, National Academy of Sciences/National Research Council
- 1993-97 Chairman, Panel on Retirement Income Modeling, National Academy of Sciences/National Research Council
- 1990-94 Chairman, Panel on the Economics of Educational Reform (PEER)
- 1984-95 Consultant, The World Bank
- 1992 Chairman, Blue Ribbon Commission on Monroe County Finances, Monroe County, NY
- 1988-91 Chairman, Panel to Evaluate Microsimulation Models for Social Welfare Programs, National Academy of Sciences/National Research Council
- 1977-83 Consultant, Mathematica Policy Research
- 1976-78 Member, Mayor's Task Force on Education, New Haven, CT
- 1975-77 Senior Research Associate, Institute for Demographic and Economic Studies
- 1975-77 Consultant, Abt Associates

1972-74 Member, RFF-Academy for Contemporary Problems, Metropolitan Governance Research Committee

1969-73 Consultant, The Rand Corporation

Invited Lectures

Spring Distinguished Speaker, Crane Center, The Ohio State University, 2016

Vilfredo Pareto Lecture, Collegio Carlo Alberto, 2013

Harris Lecture, Clemson University, 2013

Waino Pihl Lecture, Wayne State University, 2012

Distinguished Scholar Lecture, Martin School of Public Policy, University of Kentucky, 2010

Giblin Lecture, University of Tasmania, 2009

Hannah Lecture, Michigan State University, 2009

Gilbert Memorial Lecture, University of Rochester, 2008

Spencer Foundation Distinguished Lecture, Association for Public Policy Analysis and Management, 2005

Sweat Lecture, Georgia State University, 2005

Birger Lecture, Tufts University, 2005

Lee Hysan Lecture, Chinese University of Hong Kong, 2004

Askwith Lecture, Harvard University, 2003

Reilly Lecture, Louisiana State University, 2002

Mullen Lecture, University of Maryland, Baltimore County, 1999

Saks Memorial Lecture, Vanderbilt University, 1996

Editorial Activities

2016- Editorial Board, *Chinese Economics of Education Review*

2015- Editorial Advisory Board, *Journal of Professional Capital and Community*

2013- Co-Editor, *CESifo Economic Studies*

- 2007- Associate Editor, *Journal of Human Capital*
- 2005- Editorial Board, *Education Finance and Policy*
- 2000- Editorial Board, *Education Next*
- 1982- Editorial Board, *Economics of Education Review*
- 1978- 2015 Advisory Editor, *Social Science Research*
- 2004-2010 Co-editor, *Education Policy Series*, International Academy of Education/International Institute for Educational Planning, UNESCO
- 2002-2008 Editorial Board, *Fundamentals of Educational Planning*, UNESCO
- 2003-2007 Associate Editor, *Economic Bulletin*
- 1995-2002 Associate Editor, *Review of Economics and Statistics*
- 1997- 2001 Editorial Board, *Educational Evaluation and Policy Analysis*
- 1994-2001 Editorial Board, *Journal of Policy Analysis and Management*
- 1994-96 Editorial Board, *Socio-Economic Planning Sciences*
- 1991-97 Associate Editor, *Regional Science and Urban Economics*
- 1990-95 Editorial Board, *Journal of Economic Education*
- 1992-95 Advisory Board, *American Journal of Education*
- 1990-94 Co-editor, *Journal of Human Resources*
- 1987-1989 Associate Editor, *Evaluation Review*

PUBLICATIONS

Books and Monographs

Handbook of the Economics of Education, Volume 5 (co-editor with Stephen J. Machin and Ludger Woessmann). *Amsterdam: North Holland*, 2016.

The Knowledge Capital of Nations: Education and the Economics of Growth (with Ludger Woessmann) Cambridge, MA: MIT Press, 2015, 262 pages.

Universal Basic Skills: What countries stand to gain (with Ludger Woessmann). *Paris: OECD Publishing*, 2015, 110 pages.

Endangering Prosperity: A Global View of the American School (with Paul E. Peterson and

Ludger Woessmann). *Washington, DC: Brookings Press, 2013, 147 pages.*

Handbook of the Economics of Education, Volume 4 (co-editor with Stephen J. Machin and Ludger Woessmann). *Amsterdam: North Holland, 2011, 708 pages.*

Handbook of the Economics of Education, Volume 3 (co-editor with Stephen J. Machin and Ludger Woessmann). *Amsterdam: North Holland, 2010, 616 pages.*

Schoolhouses, Courthouses, and Statehouses: Solving the Funding-Achievement Puzzle in America's Public Schools (with Alfred A. Lindseth). *Princeton University Press, 2009, 432 pages.*

Handbook of the Economics of Education, Volume 2 (co-editor with Finis Welch). *Amsterdam: North Holland, 2006, 742 pages.*

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Courting Failure: How School Finance Lawsuits Exploit Judges' Good Intentions and Harm our Children (editor). *Stanford: Education Next Books, 2006, 366 pages.*

Institutional Models in Education: Legal Framework and Methodological Aspects for a New Approach to the Problem of School Governance (co-editor with Enrico Gori, Daniele Vidoni and Charles Glenn). *Nijmegen, Netherlands: Wolf Legal Publishers, 2006, 243 pages.*

The Economics of Schooling and School Quality - Volume II: Efficiency, Competition, and Policy (editor). *London: Edward Elgar Publishing Ltd., 2003.*

The Economics of Schooling and School Quality - Volume I: Labor Markets, Distribution, and Growth (editor). *London: Edward Elgar Publishing Ltd., 2003, 976 pages.*

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Improving America's Schools: The Role of Incentives (co-editor with Dale W. Jorgenson). *Washington, DC: National Academy Press, 1996, 280 pages.*

Assessing Knowledge of Retirement Behavior (co-editor with Nancy L. Maritato). *Washington, DC: National Academy Press, 1996, 288 pages.*

Modern Political Economy: Old Topics, New Directions (co-editor with Jeffrey S. Banks). *New York: Cambridge University Press, 1995, 283 pages.*

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Are U.S. Students Ready to Compete? (with Paul E. Peterson, Ludger Woessmann, and Carlos Xabel Lastra-Anadón). *Education Next*, 11(4), Fall 2011, pp. 51-59.

Private Schools and Residential Choices: Accessibility, Mobility, and Welfare (with Sinan Sarpa and Kuzey Yilmaz). *B.E. Journal of Economic Analysis & Policy (Contributions)*, 11(1) article 44, 2011, pp. 1-32.

Globally Challenged: Are U.S. Students Ready to Compete? (with Paul E. Peterson, Ludger Woessmann, and Carlos Xabel Lastra-Anadón). *PEPG Report No. 11-03*, Cambridge, MA: Program on Education Policy and Governance, Harvard University, August 2011.

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The Economic Value of Higher Teacher Quality. *Economics of Education Review*, 30(3), June 2011, pp. 466-479.

Valuing Teachers: How Much is a Good Teacher Worth? *Education Next*, 11(3), Summer 2011, pp. 40-45.

Teaching Math to the Talented: Which Countries - and States - are Producing High-Achieving Students? (with Paul E. Peterson and Ludger Woessmann) *Education Next*, Winter 2011, pp. 10-18.

Paying Teachers Appropriately In Darrel Drury and Justin Baer (ed.). *The American Public School Teacher: Past, Present, and Future*, (Cambridge, MA: Harvard Education Press), 2011, pp. 109-118.

Sample Selectivity and the Validity of International Student Achievement Tests in Economic Research (with Ludger Woessmann). *Economics Letters*, 110(2), February 2011, pp. 79-82.

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