

Helpdesk Report: Education Quality and Economic Growth: A review of the work of Eric Hanushek

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Query: Provide a review of Eric A. Hanushek's work with short summaries of his papers and an overview of main conclusions.

Purpose: To provide a review of the work of Eric A. Hanushek

Content

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1. Overview

This helpdesk report provides an annotated bibliography of Eric A. Hanushek's recent work. The focus of this report is on the papers written in the last five years (since 2008). Full versions of the papers included in this report and the papers published by Hanushek before 2008 are available from his website: <http://hanushek.stanford.edu/publications/academic>

An overview of the sections of the report and its key themes is provided below. In relevant sections, the papers are sub-divided into those which have an international focus inclusive of developing countries and those which have a focus on the US or high income countries. They are also categorised by the following document types: general audience articles; academic articles; books and working papers. The key themes are as follows:

The importance of cognitive skills/ educational achievement for economic growth

For most of the 20th century, the international debate over the economic consequences of schooling concentrated on the amount of school attained or, simply, the quantity of schooling of the population. These discussions have now moved to consider more quality dimensions of schooling and of individual skill.

Hanushek presents strong evidence that the cognitive skills of the population – rather than mere school attainment – are powerfully related to long-run economic growth. He uses economic modelling to relate cognitive skills- as measured by PISA and other international instruments- to economic growth. Cognitive skills have a clear and powerful impact on individual earnings and on aggregate outcomes through altering national growth rates. Hanushek's work includes evidence

from a wide range of low, middle and high income countries of the importance of educational achievement on economic growth. Increasing the average number of years of schooling attained by the labour force boosts the economy only when increased levels of school attainment also boost cognitive skills. In other words, it is not enough simply to spend more time in school; something has to be learned there.

Hanushek argues that developing countries have made considerable progress in closing the gap with developed countries in terms of school attainment but have been less successful in closing the gap with developed countries in relation to school quality. Without improving school quality, developing countries will find it difficult to improve their long run economic performance. School policy in developing countries should consider enhancing both basic and advanced skills. Hanushek's research identifies that school policy can be an important instrument to spur growth. He recommends that policy actions should focus directly on school quality and other means of improving cognitive skills. Evidence suggests that improving teacher quality is of central importance in any reform strategies.

Teacher Quality

Hanushek's research on teacher quality is largely focused within the US. The evidence suggests that high quality principals and teachers have a very significant impact on improving student achievement. This, in turn, has a significant impact on economic growth. Policies in the US do not ensure that quality teachers are recruited and retained in the profession. Hanushek discusses the need for significant changes in the system for hiring and training teachers; payment of teachers; strategies for increasing the number of effective teachers in high-poverty schools and the possibility of de-selecting ineffective teachers.

School Quality

High quality schools raise student achievement and speed students through primary (and perhaps secondary) schools, thus conserving on costs. Additionally, students respond to school quality in deciding whether or not to drop out of school. They tend to stay in high quality schools and drop out of low quality schools. A direct relationship between the quantity of schooling attained and the quality of that schooling is indicated. Thus, studies of the rate of return to schooling which only consider quantity of schooling produce a misleading estimate of the potential gains. Estimation of the rate of return to schooling that does not account for quality differences will systematically overstate the productivity gains that are associated with additional years of schooling, because the estimates will include quality differences that are correlated with quantity.

Comparisons of US and international student achievement

Hanushek's research includes comparisons of the learning gains of 41 US states with those of 49 countries from most of the developed and some of the newly developing parts of the world over the period between 1995 and 2009. He concludes that when compared to gains made by students in other countries, progress within the United States is middling.

Equity and achievement in the US: Race and Poverty

Hanushek assesses the role of education in improving the welfare of disadvantaged populations in the US by investigating achievement gaps for disadvantaged students. In relation to race, he finds that school racial composition has a marked effect on the grades achieved by black students, but a lesser effect on those achieved by white and Hispanic students. The evidence strongly suggests that a higher percentage of black students adversely affect the grades gained by black students. This effect is tied into teacher labour market complications, as schools with a higher proportion of black students are more likely to have a higher percentage of inexperienced teachers.

School Location

Poverty, race and schooling have been shown to be very highly correlated with location. The economic circumstances of individuals combined with the institutional structure of public decision

making in the United States leads to a very close link of location, housing, and education. As a result, residential decisions have added implications for households. In addition, the reliance on the local tax for a large portion of school funding implies that the governmental grant system has an important effect on both locational decisions and educational outcomes. It is also important to consider how households respond to policies that change the attractiveness of different residential locations. School quality and welfare can be reduced for all families if restrictions on choice are introduced. The type of schools in each location is also important. The existence of private schools enhances the welfare of all households including both those attending private schools and those attending public schools. Private schools also reduce the amount of housing and school segregation in equilibrium.

Finance and student achievement

Funding of education tends to focus on two areas: the mechanism of financial distribution, and how student performance relates to the amount of financing per student. Finance discussions cannot be separated from broader educational policy discussions because it is important to integrate finance incentives with other policies designed to improve achievement. It is important to remember that a purely cost-functional approach cannot tell us the amount of spending required to achieve a certain level of performance.

2. The importance of cognitive skills/ educational achievement for economic growth

2. a. International/ Developing Country Focus

2. a. i. General Audience Articles

Eric A. Hanushek, Ludger Woessmann. Education and Economic Growth. *Economics of Education* (Amsterdam: Elsevier, 2010), 2010, pp. 60-67.

This article reviews the role of education in promoting economic growth, with a particular focus on the role of educational quality. It concludes that there is strong evidence that the cognitive skills of the population – rather than mere school attainment – are powerfully related to long-run economic growth.

Eric A. Hanushek, Dean T. Jamison, Elliot A. Jamison, Ludger Woessmann. Education and Economic Growth: It's not Just Going to School but Learning That Matters. *Education Next*, 8(2), Spring 2008, pp. 62-70

In a series of studies, the authors explore the role of both school attainment and cognitive skills in economic growth. They used performance on 12 standardized maths and science tests as rough measures of the average level of cognitive skill in a given country. With this information, they could assess how human capital relates to differences in economic growth for 50 countries from 1960 to 2000. They conclude that the level of cognitive skills of a nation's students has a large effect on its subsequent economic growth rate. Increasing the average number of years of schooling attained by the labour force boosts the economy only when increased levels of school attainment also boost cognitive skills. In other words, it is not enough simply to spend more time in school; something has to be learned there.

2. a. ii. Academic Articles

Eric A. Hanushek. Economic Growth in Developing Countries: The Role of Human Capital. *Economics of Education Review*, Forthcoming

The focus on human capital as a driver of economic growth for developing countries has led to

undue attention on school attainment. Developing countries have made considerable progress in closing the gap with developed countries in terms of school attainment, but recent research has underscored the importance of cognitive skills for economic growth. This result shifts attention to issues of school quality, and there developing countries have been much less successful in closing the gaps with developed countries. Without improving school quality, developing countries will find it difficult to improve their long run economic performance. Some key points from this paper include:

- Improvements in long run growth are closely related to the level of cognitive skills of the population..
- Development policy has inappropriately emphasized school attainment as opposed to educational achievement, or cognitive skills.
- Developing countries, while improving in school attainment, have not improved in quality terms.
- School policy in developing countries should consider enhancing both basic and advanced skills.

Eric A. Hanushek, Ludger Woessmann. Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation. *Journal of Economic Growth*, 17(4), December 2012, 267-321.

In this paper, the authors develop a new metric for the distribution of educational achievement across countries that can further track the cognitive skill distribution within countries and over time. A close relationship between educational achievement and GDP growth is identified that is remarkably stable. In a series of approaches for addressing causality, the authors narrow the range of plausible interpretations of this strong cognitive skills-growth relationship. These alternative estimation approaches leave the stylized fact of a strong impact of cognitive skills unchanged. Moreover, the results indicate that school policy can be an important instrument to spur growth. The shares of basic literates and high performers have independent relationships with growth, the latter being larger in poorer countries.

Eric A. Hanushek, Ludger Woessmann. Schooling, Educational Achievement, and the Latin American Growth Puzzle. *Journal of Development Economics*, 99(2), November 2012, pp. 497-512.

This paper seeks to address why despite having reasonable school attainment, Latin America had such a poor growth performance relative to Asia and even MENA, given its high schooling level in 1960. The region has trailed most other world regions over the past half century despite relatively high initial development and school attainment levels. This puzzle, however, can be resolved by considering educational achievement, a direct measure of human capital. The authors introduce a new, more inclusive achievement measure that comes from splicing regional achievement tests into worldwide tests. In growth regressions, the positive growth effect of educational achievement fully accounts for the poor growth performance of Latin American countries. Once educational achievement is included, human capital can account for between half and two thirds of the income differences between Latin America and the rest of the world.

Eric A. Hanushek, Ludger Woessmann. In Matthias von Davier, Eugenio Gonzalez, Irwin Kirsch, and Kentaro Yamamoto (Ed.), *The Role of International Assessments of Cognitive Skills in the Analysis of Growth and Development. The Role of International Large-Scale Assessments: Perspectives from Technology, Economy, and Educational Research*, Dordrecht, Netherlands: Springer, 2012, 47-65.

This book chapter identifies that Economists have found the concept of human capital to be very useful in explaining not only differences in individual earnings but also variations in the well-being of nations. Because of the importance of the human capital, another strand of research has delved into the determinants of relevant skills. Both lines of inquiry have advanced markedly with

development and expansion of international testing of achievement, particularly in maths and science.

While most analyses of growth and development emphasize the central role of human capital, measurement issues have plagued both research and policy development. Specifically, attention to school attainment and enrollment rates appears to be misdirected. In contrast, recent work has shown that the measures of cognitive skills that can be derived from international assessments greatly improve the ability to explain differences in economic growth rates across countries. Moreover, improved cognitive skills appear to have dramatic impacts on the future economic well-being of a country, suggesting that policy actions should focus directly on school quality and other means of improving cognitive skills.

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

This research note draws on detailed information on sampling quality to estimate whether international differences in sample selection affect the outcomes of typical economic analyses. The results suggest that countries having more schools and students excluded from the targeted sample, having schools and students who are less likely to participate in the test, and having higher overall school enrollment at the relevant age level tend to perform better on the international tests. However, none of these sampling patterns affect the results of typical growth regressions, implying that they are unrelated to the associations of interest in these economic analyses.

Eric A. Hanushek, Ludger Woessmann. The Economics of International Differences in Educational Achievement. In Eric A. Hanushek, Stephen Machin and Ludger Woessmann (Eds.), *Handbook of the Economics of Education*, Vol. 3, Amsterdam: North Holland, 2011, pp. 89-200.

An emerging economic literature over the past decade has made use of international tests of educational achievement to analyze the determinants and impacts of cognitive skills. This chapter reviews the economic literature on international differences in educational achievement, restricting itself to comparative analyses that are not possible within single countries and placing particular emphasis on studies trying to address key issues of empirical identification. While quantitative input measures show little impact, several measures of institutional structures and of the quality of the teaching force can account for significant portions of the immense international differences in the level and equity of student achievement. Variations in skills measured by the international achievement tests are in turn strongly related to individual labour-market outcomes and, perhaps more importantly, to cross-country variations in economic growth.

Eric A. Hanushek. School Policy: Implications of Recent Research for Human Capital Investments in South Asia and Other Developing Countries. *Education Economics*, 17(3), September 2009, pp. 291-313.

This paper reviews evidence on the economic impacts of human capital investment with an eye to where investment decisions might be made. While the evidence on actual impacts is quite clear, the evidence on how best to make the investments is less clear. Specifically, recent research underscores the prime importance of educational quality, as measured by cognitive achievement, and the much lower importance of pure school attainment. Concentration on school attainment goals without close attention to school quality has hurt developing countries. Recent evidence shows that individual incomes, the distribution of income, and economic growth rates are all closely related to the cognitive skills of the population. While direct evidence from developing countries is thin, the evidence from developed countries points to the central importance of improving teacher quality in any reform strategies.

Eric A. Hanushek, Lei Zhang . Quality-Consistent Estimates of International Schooling and Skill Gradients. *Journal of Human Capital*, 3(2), Summer 2009, pp. 107-143.

In this paper the authors combine quality-adjusted measures of schooling and international literacy test information to estimate skill gradients for 13 countries. Wage equations based on schooling as a proxy for human capital and individual labour market skills focus on the earnings premium associated with additional schooling but generally fail to account for changes in education quality over time. School attainment is an inadequate proxy of individual skills because both family inputs and ability affect cognitive skills and therefore nonschool factors must be accounted for.

Eric A. Hanushek. In Gary Sykes, Barbara Schneider and David N. Plank (eds.), *The Economic Value of Education and Cognitive Skills. in Handbook of Education Policy Research*, New York: Routledge, 2009, pp. 39-56.

In terms of student performance, most developed countries are acutely aware of how their students do in comparison to students elsewhere in the world. The now frequent scores on PISA and TIMSS provide direct feedback on the performance of students. But, as comparative test scores have become more plentiful, two key questions arise. First, do scores on these tests make any difference and how can they be changed by any governmental policies? This chapter emphasizes the first but addresses both of these questions. Education is one of the top priority policy areas of governments around the world and is often viewed as an essential element in global economic competition. It is further taken as a force for improving the economic standing of disadvantaged populations within borders and, in the case of foreign aid, across borders. Questions remain about whether the clear impacts of quality in the United States and developed countries generalize to other countries, particularly developing countries. The literature on returns to cognitive skills in developing countries is restricted to a relatively limited number of countries: Ghana, Kenya, Morocco, Pakistan, South Africa, and Tanzania.

The relationship between measured labour force quality and economic growth is perhaps even more important than the impact of human capital and cognitive skills on individual productivity and incomes. Moreover, the education of each individual has the possibility of making others better off. A more skilled society may lead to higher rates of invention, may make everyone more productive through the ability of firms to introduce new and better production methods, and may lead to more rapid introduction of new technologies. These externalities provide extra reason for being concerned about cognitive skills and the quality of schooling.

Eric A. Hanushek, Ludger Woessmann. *The Role of Cognitive Skills in Economic Development. Journal of Economic Literature* 2008, 46(3), 2008, pp. 607-668.

This paper reviews the role of cognitive skills in promoting economic well-being. It concludes that there is strong evidence that the cognitive skills of the population—rather than mere school attainment—are powerfully related to individual earnings, to the distribution of income, and to economic growth. International comparisons incorporating expanded data on cognitive skills reveal much larger skill deficits in developing countries than generally derived from just school enrolment and attainment. In eleven of the fourteen countries compared, the share of fully literate students in recent cohorts is less than one third. In Ghana, South Africa, and Brazil, only 5 percent, 7 percent, and 8 percent of a cohort, respectively, reach literacy.

Schooling that does not improve cognitive skills, measured here by comparable international tests of mathematics, science, and reading, has limited impact on aggregate economic outcomes and on economic development. The accumulated evidence from analyses of economic outcomes is that cognitive skills have powerful economic effects. The magnitude of change needed makes clear that closing the economic gap with developed countries will require major structural changes in schooling institutions.

Eric A. Hanushek. Incentives for Efficiency and Equity in the School System. *Perspektiven der Wirtschaftspolitik*, 9 (Special Issue), 2008, pp. 5-27.

Cognitive skills determine not only individual earnings but also national growth rates. While prior studies concentrated on just school attainment as a measure of human capital, the availability of more refined quality measures using student achievement assessments demonstrates the inadequacies of these pure quantity measures of schooling. Direct measures of cognitive skills are far superior measures of the human capital of individuals and of nations. Improving cognitive skills, has, however, proved difficult. The only viable approach appears to be improving the incentives for higher performance.

Desirable behaviour by schools and teachers is rewarded in a variety of ways through governmental programs, and these attempts generally show positive impacts. Incentives can take the form of supply, demand and behavioural reward. Students and their families do respond strongly to the incentives that they face. This presents a positive finding for the direction of future program development, in developing as well as developed countries. However, the limited application of these programs does leave a variety of remaining questions about the magnitude of any impacts.

2. a. iii. Working Papers

Eric A. Hanushek, Ludger Woessmann, Lei Zhang. General Education, Vocational Education, and Labor-Market Outcomes over the Life-Cycle. *NBER Working Paper 17504*, October 2011.

Most advanced economies are concerned about the ease with which young workers can make the transition from school to work. Policy debates about the balance of vocational and general education programs focus on the school-to-work transition. But with rapid technological change, gains in youth employment from vocational education may be offset by less adaptability and thus diminished employment later in life. To test the main hypothesis that any relative labour-market advantage of vocational education decreases with age, a difference-in-differences approach is used that compares employment rates across different ages for people with general and vocational education. Using micro-data for 18 countries from the International Adult Literacy Survey, strong support is found for the existence of such a trade-off, which is most pronounced in countries emphasizing apprenticeship programs.

2. b. US/ High income country focus

2. b. i. General Audience Articles

Eric A. Hanushek, Ludger Woessmann. The High Cost of Low Educational Performance: The Long-Run Impact of Improving PISA Outcomes. Paris: Organization for Economic Cooperation and Development, 2010, pp. 1-55.

This paper uses recent economic modelling to relate cognitive skills – as measured by PISA and other international instruments – to economic growth. It explains how while many nations express a commitment to improved educational quality, education often slips down on the policy agenda when pressures on budgets or other issues arise. Because the benefits of educational investments are seen only in the future, it is possible to underestimate the value and the importance of improvements. Past experiences suggest that there are enormous economic gains to be had by OECD countries that can improve the cognitive skills of their populations. Moreover, the gains, put in terms of current GDP, far outstrip the value of short-run business-cycle management. This is not to say that efforts should not be directed at current issues of economic recession, but it is to say that the long-run issues should not be neglected.

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

At a time of persistent unemployment, especially among the less skilled, many wonder whether US schools are adequately preparing students for the 21st-century global economy. Despite high unemployment rates, firms are experiencing shortages of educated workers, outsourcing professional-level work to workers abroad, and competing for the limited number of employment visas set aside for highly skilled immigrants.

2.b.ii. Academic Articles

Eric A. Hanushek. Education quality and economic growth. In Brendan Miniter (ed.), *The 4 percent solution: Unleashing the economic growth America needs*, New York: Crown Business, 2012, pp. 227-239.

Since the recession of 2008, the United States has been debating how to restore and enhance the health of its economy. But what has been lost in this short-run focus on stimulus spending and federal deficits is the need to reform the nation's public schools, the engine behind any long-run growth. An economy's ability to grow over time-its ability to innovate and raise both productivity and real incomes-is strongly tied to the quality of education provided to the vast majority of workers. Skills and intellectual capital are increasingly important in a modern economy, and schools play a central role in the development of valuable skills.

Eric A. Hanushek, Ludger Woessmann. The Economic Benefit of Educational Reform in the European Union. *CESifo Economic Studies*, 58(1), March 2012, pp. 73–109

In its Europe 2020 strategy, the 10-year successor of the Lisbon strategy, the European Council (2010) set out a "framework for the Union to mobilize all of its instruments and policies" to advance jobs and smart, sustainable and inclusive growth." Education looms high in this strategy, as one of the "five EU headline targets ... which will constitute shared objectives guiding the action of Member States and the Union". This paper utilizes recent econometric research to quantify the benefit, in terms of increased future GDP, that the European Union and its Member States would reap from improved educational achievement. The results suggest that while improving human capital in EU countries has the potential for substantial economic gain, the specific policy choices are less clearly appropriate.

The European Union has consistently recognized the importance of educating its citizens, often framed in terms of developing a human capital policy. A prime motivation is ensuring that all citizens within the EU have the skills needed to compete in a modern, integrated society. But the implications of education go beyond the impact on individual ability to compete. Current macroeconomic research about the growth of nations strongly indicates that the future health of an economy depends on the cognitive skills of its workers.

Eric A. Hanushek, Ludger Woessmann. How Much Do Educational Outcomes Matter in OECD Countries? *Economic Policy*, 26(67), July 2011, pp. 427-491.

Existing growth research provides little explanation for the very large differences in long-run growth performance across OECD countries. The authors show that cognitive skills can account for growth differences within the OECD, whereas a range of economic institutions and quantitative measures of tertiary education cannot. Under the growth model estimates, school improvements falling within currently observed performance levels yield very large gains. The present value of OECD aggregate gains through 2090 could be as much as \$275 trillion, or 13.8 percent of the discounted value of future GDP. The economic impact of improved educational outcomes is enormous. The authors close by discussing evidence on which education policy reforms may be able to bring about the simulated improvements in educational outcomes.

Eric A. Hanushek. Education Production Functions: Developed Countries Evidence. In Dominic J. Brewer and Patrick J. McEwan (Ed.), Economics of Education (Amsterdam: Elsevier, 2010), 2010, pp. 132-136.

Economists and other social scientists have accumulated convincing evidence that education makes individuals more productive and thus increases their incomes. Education also provides non-pecuniary benefits, such as improved health and social integration. Much of the gap in living standards between developed and developing countries may be due to wide gaps in education. Thus, efforts to raise enrolment rates and to increase student learning could greatly improve living standards in developing countries.

2.b.iii. Books

Eric A. Hanushek, Stephen J. Machin, Ludger Woessmann (Ed). Handbook of the Economics of Education, Volume 4. Amsterdam: North Holland, 708 pages, 2011. and Eric A. Hanushek, Stephen J. Machin, Ludger Woessmann (Ed). Handbook of the Economics of Education, Volume 3. Amsterdam: North Holland, 616 pages, 2010.

Volumes 3 and 4 of the Handbooks in the Economics of Education consider two questions: what is the value of an education, and how does education affect economic and social outcomes, and how can it inform public policy? The handbooks combine recent data with new methodologies to examine this and related questions from diverse perspectives. School choice and school competition, educator incentives, the college premium, and other considerations help make sense of the investments and returns associated with education. They examine the determinants of educational outcomes and issues surrounding teacher salaries and licensure. And reflecting government demands for more evidence-based policies, they take new looks at institutional features of school systems. The editors draw clear lines between newly emerging research on the economics of education and measure our current understanding of educational acquisition and its economic and social effects.

3. Teacher Quality

3. a. General Audience Articles

Gregory F. Branch, Steven G. Rivkin, Eric A. Hanushek. School Leaders Matter: Measuring the impact of effective principals. Education Next, 13(1), Winter 2013, pp. 62-69.

It is widely believed that a good principal is the key to a successful school. Yet until very recently there was little rigorous research demonstrating the importance of principal quality for student outcomes, much less the specific practices that cause some principals to be more successful than others. This study provides new evidence on the importance of school leadership by estimating individual principals' contributions to growth in student achievement. Our results indicate that highly effective principals raise the achievement of a typical student in their schools by between two and seven months of learning in a single school year; ineffective principals lower achievement by the same amount.

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

For some time, it has been recognized that the academic achievement of schoolchildren in the US threatens, to borrow President Barack Obama's words, "the U.S.'s role as an engine of scientific discovery" and ultimately its success in the global economy. The low achievement of American students, as reflected in the Program for International Student Assessment (PISA) will prevent them from accessing good, high-paying jobs. From studying the historical relationship, we can estimate that closing just half of the performance gap with Finland, one of the top international performers in terms of student achievement, could add more than \$50 trillion to US

gross domestic product between 2010 and 2090. By way of comparison, the drop in economic output over the course of the last recession is believed to be less than \$3 trillion. Thus the achievement gap between the U.S. and the world's top-performing countries can be said to be causing the equivalent of a permanent recession.

Eric A. Hanushek. Paying Teachers Appropriately. The American Public School Teacher: Past, Present, and Future, (Cambridge, MA: Harvard Education Press), 2011, pp. 109-118.

There is a simple story that describes US schools and that on the surface just does not make sense. It goes like this: teachers are the most important element of schools; high quality schools are valued, and we want to improve their performance; but there is an unwillingness to permit the pay of teachers to keep up with pay elsewhere in the US economy. This piece will build on the salient parts of this history in order to discuss a range of policy options that have been proposed. An underlying theme is that the current pay structure—the single-salary structure — acts to turn policy makers away from any substantial increases in teacher pay. As a result, any efforts to improve schools through attracting and retaining effective teachers are handicapped by eliminating use of monetary incentives.

Eric A. Hanushek. The Difference is Teacher Quality. Waiting for "Superman": How We Can Save America's Failing Public Schools. New York: Public Affairs, 2010, pp. 81-100.

The United States is built on the idea that all individuals should be free to reach their full potential – the “pursuit of happiness” mentioned in the Declaration of Independence as one of the “unalienable rights” all Americans share. And a natural corollary is that society has the responsibility to provide at least the basic tools individuals need to pursue this goal effectively. While many aspects are involved in the accomplishing this goal, our schools clearly have a key role. But it is also clear that the schools have not been doing as much as they could to ensure that all Americans have the knowledge and skills they need to succeed in the twenty-first century. As a result, school reform is a topic on many people's minds today – as it should be. It is becoming broadly recognised that quality teachers are a key ingredient to a successful school and to improved student achievement. Yet standard policies in the US do not ensure that quality teachers are recruited or retained in the profession. Without significant changes in the system for hiring and training teachers, the hope of systematically improving student outcomes is small.

Kati Haycock, Eric A. Hanushek. An Effective Teacher in Every Classroom: A lofty goal, but how to do it Education Next, 10(3), Summer 2010, pp. 46-52.

Proposals to reauthorize No Child Left Behind seek to ensure “equitable” access to effective teachers. The U.S. Department of Education's Race to the Top fund rewards state plans for “ensuring equitable distribution of effective teachers and principals” and for “ambitious yet achievable annual targets to increase the number and percentage of highly effective teachers...in high-poverty schools.” This paper seeks to address the questions of how readily can we identify effective teachers and what are promising strategies for seeking to increase the number of effective teachers in high-poverty schools and communities?

Eric A. Hanushek. Teacher Deselection. Creating a New Teaching Profession, Washington, DC: Urban Institute Press, 2009, pp. 165-180

This paper investigates one approach to improving the performance of students in the US—teacher deselection. It asks how much progress in student achievement could be accomplished by instituting a program of removing, or deselection, the least effective teachers? A variety of policies for hiring and retraining teachers have been proposed, but they have not been very successful in the aggregate, as student performance has not improved. At the same time it is widely recognised that some teachers do a very poor job and few people believe that the worst teachers can be transformed into good teachers. It seeks to answer the question of what would happen if a policy of systematically removing the most ineffective teachers was adopted.

3. b. Academic Articles

Eric A. Hanushek, Steven G. Rivkin. The Distribution of Teacher Quality and Implications for Policy Annual Review of Economics, 4, September 2012, pp. 131-157.

It has become commonplace to measure teacher quality in terms of teacher value-added. Operationally this means evaluating teachers according to the learning gains of students on various achievement tests. Existing research consistently shows large variations in teacher effectiveness, much of which is within schools as opposed to between schools. The policy implications of these variations are dramatic. But, the underlying statistical modelling has become the subject of intense research, in part because of the direct use of value-added measures in policy discussions.

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

Most analyses of teacher quality end without any assessment of the economic value of altered teacher quality. This paper begins with an overview of what is known about the relationship between teacher quality and student achievement. Alternative valuation methods are based on the impact of increased achievement on individual earnings and on the impact of low teacher effectiveness on economic growth through aggregate achievement. A teacher one standard deviation above the mean effectiveness annually generates marginal gains of over \$400,000 in present value of student future earnings with a class size of 20 and proportionately higher with larger class sizes. Replacing the bottom 5-8 percent of teachers with average teachers could move the U.S. near the top of international math and science rankings with a present value of \$100 trillion.

Eric A. Hanushek, Steven G. Rivkin. Generalizations about Using Value-Added Measures of Teacher Quality. American Economic Review, 100(2), May 2010, pp. 267-271.

The extensive investigation of the contribution of teachers to student achievement produces two generally accepted results. First, there is substantial variation in teacher quality as measured by the value added to achievement or future academic attainment or earnings. Second, variables often used to determine entry into the profession and salaries including post-graduate schooling, experience, and licensing examination scores appear to explain little of the variation in teacher quality so measured with the exception of early experience. Together these findings underscore explicitly that observed teacher characteristics do not represent teacher quality. Education production function research on the measurement of teacher value added to student achievement represents a shift from a research design that focuses on the link between student outcomes and specific teacher characteristics to a research framework that uses a less parametric approach to identify overall teacher contributions to learning. Using administrative data bases, some covering all of the teachers in a state, such research provides strong support for the existence of substantial differences in teacher effectiveness, even within schools. Although this approach circumvents the need to identify specific teacher characteristics related to quality, the less parametric approach introduces additional complications and has sparked an active debate on the measurement and subsequent policy use of estimated teacher value added.

3. b. Working papers

Gregory F. Branch, Eric A. Hanushek, Steven G. Rivkin. Estimating the Effect of Leaders on Public Sector Productivity: The Case of School Principals. NBER Working Paper 17803, January 2012.

Little quantitative evidence is available regarding the importance of leadership in the determination of organisational success, mainly due to the difficulty of separating the impact of

leaders from other organizational components – particularly in the public sector. Schools provide a rich environment for studying the impact of public sector management, not only because of the hypothesized importance of leadership but also because of the plentiful achievement data that provide information on institutional outcomes. Outcome-based estimates of principal value-added to student achievement reveal significant variation in principal quality that appears to be larger for high-poverty schools. Other estimates based on direct estimation yield smaller variations in principal productivity but ones that are still important, particularly for high poverty schools. Patterns of teacher exits by principal quality validate the notion that a primary channel for principal influence is the management of teachers. Finally, looking at principal transitions by quality reveals little systematic evidence that more effective leaders have a higher probability of exiting high poverty schools.

Eric A. Hanushek, Steven G. Rivkin. Constrained Job Matching: Does Teacher Job Search Harm Disadvantaged Urban Schools? *NBER Working Paper 15816*, March 2010.

Search theory suggests that early career job changes on balance lead to better matches that benefit both workers and firms, but this may not hold in teacher labour markets characterized by salary rigidities, barriers to entry, and substantial differences in working conditions that are difficult for institutions to alter. Of particular concern to education policy makers is the possibility that teacher turnover adversely affects the quality of instruction in schools serving predominantly disadvantaged children. Although such schools experience higher turnover on average than others, the impact on the quality of instruction depends crucially on whether it is the more productive teachers who are more likely to depart. The absence of direct measures of productivity typically hinders efforts to measure the effect of turnover on worker quality. In the case of teachers, however, the availability of matched panel data of students and teachers, enables the isolation of the contributions of teachers to achievement despite the complications of purposeful choices of families, teachers, and administrators. The empirical analysis reveals that teachers who remain in their school tend to outperform those who leave, particularly those who exit the Texas public schools entirely. Moreover, this gap appears to be larger for schools serving predominantly low income students, evidence that high turnover is not nearly as damaging as many suggest.

4. School Quality

4.a. General Audience Articles

Eric A. Hanushek. The Cost of Ignorance. *La Sfida Della Valutazione*, Bolgna, IT: Società Editrice il Mulino, 2012, pp. 39-46.

The rewards to improving schools are very, very large, but the policies that are needed are politically difficult. Nonetheless, the direction of schools needs to be changed in order to improve student outcomes.

4. b. ii. Academic Articles

Eric A. Hanushek, Victor Lavy. Do Students Care about School Quality? Determinants of Dropout Behavior in Developing Countries. *Journal of Human Capital*, 2(1), 2008, pp. 69-105.

The focus is on how school quality affects student decisions in developing countries to drop out of school, a topic of increasing importance as efforts to increase schooling levels are expanded. Almost all developing countries are rightfully concerned about the problem of low school completion rates, both because of lost investment opportunities for society and because of general inefficiency in the provision of public schooling.

School quality and grade completion by students are shown to be directly linked. Unique panel data on primary school-age children in Egypt permit estimation of behavioural models of school

leaving that incorporate output-based measures of school quality. With the student's own ability and achievement held constant, a student is much less likely to remain in school if attending a low-quality school rather than a high-quality school. This individually rational behaviour suggests that common arguments about a trade-off between quality and access to schools may misstate the real issue and lead to public investment in too little quality.

Eric A. Hanushek. In Steven N. Durlauf and Lawrence E. Blume (eds.), Education Production Functions. *The New Palgrave Dictionary of Economics*, Basingstoke: Palgrave Macmillan, 2008.

The accumulated economic analysis of education suggests that current provision of schooling is very inefficient. Commonly purchased inputs to schools – class size, teacher experience, and teacher education – bear little systematic relationship to student outcomes, implying that conventional input policies are unlikely to improve achievement. At the same time, differences in teacher quality have been shown to be very important. Unfortunately, teacher quality, defined in terms of effects on student performance, is not closely related to salaries or readily identified attributes of teachers.

Eric A. Hanushek, Susanne Link, Ludger Woessmann. Does School Autonomy Make Sense Everywhere? Panel Estimates from PISA *Journal of Development Economics*, Forthcoming.

Decentralization of decision-making is among the most intriguing recent school reforms, in part because countries went in opposite directions over the past decade and because prior evidence is inconclusive. The authors suggest that autonomy may be conducive to student achievement in well developed systems but detrimental in low-performing systems. They construct a panel dataset from the four waves of international PISA tests spanning 2000-2009, comprising over one million students in 42 countries. Their results suggest that autonomy affects student achievement negatively in developing and low-performing countries, but positively in developed and high-performing countries.

5. Comparisons of US and international student achievement

5. a. General Audience Articles

Eric A. Hanushek, Paul E. Peterson, Ludger Woessmann. Is the U.S. catching up? International and state trends in student achievement. *Education Next*, 12(4), Fall 2012, pp. 24-33.

To find out whether the United States is narrowing the international education gap, the authors compare learning gains over the period between 1995 and 2009 for 49 countries from most of the developed and some of the newly developing parts of the world. They extend this comparison to 41 states within the United States, allowing them to compare each of these states to the 48 other countries. In absolute terms, the performance of U.S. students in 4th and 8th grade on the NAEP in math, reading, and science improved noticeably between 1995 and 2009. Yet when compared to gains made by students in other countries, progress within the United States is middling.

Eric A. Hanushek, Paul E. Peterson, Ludger Woessmann. Achievement growth: International and state trends in student achievement. PEPG Report No. 12-03, July 2012.

To find out the extent of U.S. progress toward closure of the international education gap, the authors provide estimates of learning gains over the period between 1995 and 2009 for the United States and 48 other countries from much of the developed and some of the newly developing parts of the world. They also examine changes in student performance in 41 states within the United States, allowing them to compare these states with each other as well as with the 48 other countries.

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

Maintaining US productivity depends importantly on developing a highly qualified cadre of scientists, engineers, entrepreneurs, and other professionals. To realize that objective requires a system of schooling that produces students with advanced math and science skills. To see how well schools in the United States do at producing high-achieving math students, the authors compared the percentage of U.S. students in the high-school graduating Class of 2009 with advanced skills in mathematics to percentages of similarly high achievers in other countries. They found that the percentage of students in the U.S. Class of 2009 who were highly accomplished in math is well below that of most countries with which the United States generally compares itself.

Eric A. Hanushek, Paul E. Peterson, Ludger Woessmann. U.S. Math Performance in Global Perspective: How Well Does Each State Do at Producing High-Achieving Students? *PEPG Report No. 10-19*, Cambridge, MA: Program on Education Policy and Governance, Harvard University, November 2010.

To see how well the U.S. as a whole, each state, and certain urban districts do at producing high-achieving math students, the percentage of U.S. public and private school students in the high-school graduating Class of 2009 who were highly accomplished in mathematics in each of the 50 states and in 10 urban districts is compared to the percentages of similarly high achievers in 56 other countries.

6. Equity and achievement in the US: Race and Poverty

6. a. General Audience Articles

Eric A. Hanushek. How well do we understand achievement gaps? *Focus*, 27(2), Winter 2010, pp. 5-12.

This article assesses what we currently know about the role of education in improving the welfare of the disadvantaged population in the US by looking at one particular aspect of the subject, achievement gaps for disadvantaged students. The literature is reviewed related to measured cognitive skills, focusing on achievement rather than school attainment.

6. b. Academic Articles

Eric A. Hanushek, John F. Kain, Steven G. Rivkin New Evidence about *Brown v. Board of Education*: The Complex Effects of School Racial Composition on Achievement. *Journal of Labor Economics*, 27(3), July 2009, pp. 349-383.

Uncovering the effect of school racial composition is difficult because racial mixing is not accidental but instead an outcome of government and family choices. Panel data on the achievement of Texas students is used to disentangle racial composition effects from other aspects of school quality and from differences in abilities and family background. The estimates strongly indicate that a higher percentage of black schoolmates reduces achievement for blacks, while it implies a much smaller and generally insignificant effect on whites. The pattern of estimates provides strong evidence that school proportion black (not minority) negatively affects mathematics achievement of blacks.

These results suggest that existing levels of segregation in Texas explain a small but meaningful portion of the racial achievement gap. The policy implications of these findings are, nonetheless, unclear, largely because of the imbalance in the distribution of students across jurisdictions.

Eric A. Hanushek, Steven G. Rivkin. Harming the Best: How Schools Affect the Black-White Achievement Gap. *Journal of Policy Analysis and Management*, 29(3), Summer 2009, pp. 366-393.

Sizeable achievement differences by race appear in early grades, but substantial uncertainty exists about the impact of school quality on the black–white achievement gap and particularly about its evolution across different parts of the achievement distribution. Texas administrative data show that the overall growth in the achievement gap between third and eighth grades is larger for students with higher initial achievement and that specific teacher and peer characteristics explain a substantial share of the widening. The adverse effect of attending school with a high black enrolment share appears to be an important contributor to the larger growth in the achievement differential in the upper part of the test score distribution. This evidence reaffirms the major role played by peers and school quality, but also presents a policy dilemma. The results are tied into the probability and proportion of schools with high black enrolments having relatively inexperienced teachers. Because teachers cannot be required to teach in particular districts, urban districts may have a very difficult time raising salaries high enough to attract experienced teachers to high-poverty, high-proportion-black schools. Teacher labour market complications, current housing patterns, legal limits to desegregation efforts, and uncertainty about the overall effects of specific desegregation programs indicate that effective policy responses will almost certainly involve a set of school improvements beyond simple changes in peer racial composition and the teacher experience distribution.

7. School Location

Eric A. Hanushek, Kuzey Yilmaz. Land Use Controls and the Provision of Education. NBER Working Paper 17730, January 2012

This paper presents a general equilibrium model of location and the provision of education. It then analyses what the market effects of land-use controls are and how successful they are. The policies considered (minimum lot size zoning, local public finance with a head tax, and fringe zoning) demonstrate how household behaviour directly affects the equilibrium outcomes and the provision of the local public good.

Eric A. Hanushek, Kuzey Yilmaz. Household location and schools in metropolitan areas with heterogeneous suburbs: Tiebout, Alonso, and government policy. *Journal of Public Economic Theory*, Forthcoming

Many discussions of school finance policy fail to consider how households respond to policies that change the attractiveness of different residential locations. This paper develops a general equilibrium model that incorporates workplace choice, residential choice, and political choice of tax and expenditure levels. Multiple workplaces, a fundamental feature of today's metropolitan landscape, are considered. This basic model permits investigating how accessibility and public goods interact in a metropolitan area. The model is used to analyze two conventional policy initiatives: school district consolidation and district power equalization. The surprising conclusion is that school quality and welfare can fall for all families when these restrictions on choice are introduced.

Eric A. Hanushek, Kuzey Yilmaz. Urban education, location, and opportunity in the United States. In Nancy Brooks, Kieran Donaghy, and Gerrit-Jan Knaap (ed.), *Oxford Handbook of Urban Economics and Planning*, Oxford: Oxford University Press, 2011, pp. 583-615.

This chapter provides a theoretical and empirical discussion of the interaction of location and schooling. Much of the educational story of the United States can be summarized by economic status and race. In turn, there is a locational aspect to much of this story. In simplest terms, poverty, race and schooling are very highly correlated with location. Individual economic circumstances combined with the institutional structure of public decision making in the United

States lead to a very close link of location, housing, and education. As a result, residential decisions have added implications for households. Moreover, the reliance on the local tax for a large portion of school funding implies that the governmental grant system has an important effect on both locational decisions and educational outcomes.

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

Private schools free households from a strict link between residential location decisions and the tax-school quality bundles they consume. In order to study the impact of private schools on educational outcomes, the authors have developed a general equilibrium model that simultaneously incorporates locational choice built on access and locational choice built on tax-school quality attributes of jurisdictions. The paper concludes that private school choice enhances the welfare of all households—both those attending private schools and those attending public schools—while also working to reduce the amount of housing and school segregation in equilibrium. Investigation of alternative school policies indicates that greater choice, including using targeted school vouchers, can improve welfare and achievement. Finally, this paper demonstrates how the fiscal burden arising from some households paying less taxes than they consume in public services varies significantly with the structure of school choice options.

8. Finance and student achievement

8. a. Academic Articles

Eric A. Hanushek. Financing Schools In John Hattie and Eric M. Anderman (ed.), International Guide to Student Achievement, New York: Routledge, 2013, pp. 134-136.

Around the world, schools are overwhelmingly controlled and operated by governments, and governmental policies directly affect much of what goes on in schools. The financing of schools has traditionally been addressed from two different perspectives. For the longest period, the central issues have revolved around how money for schools is raised and how it is distributed to local schools. These issues fit naturally into the policy debates around where a society's resources should be invested, along with the related question of how much is spent on schools. Over the past half century, however, a second perspective has entered into the debates, namely, how student performance relates to the financing of schools. This latter perspective has dramatically shifted the policy discussions about school finance. It has also made it clear that finance discussions cannot be separated from broader educational policy discussions because it is important to integrate finance incentives with other policies designed to improve achievement.

Robert Costrell, Eric A. Hanushek, Susanna Loeb. What Do Cost Functions Tell Us About the Cost of an Adequate Education? Peabody Journal of Education, 83(2), 2008, pp. 198-223.

Econometric cost functions have begun to appear in education adequacy cases with greater frequency. Cost functions are superficially attractive because they give the impression of objectivity, holding out the promise of scientifically estimating the cost of achieving specified levels of performance from actual data on spending. However, education cost functions do not in fact tell us the cost of achieving any specified level of performance. Instead, they provide estimates of average spending for districts of given characteristics and current performance. It is a huge and unwarranted stretch to go from this interpretation of regression results to the claim that they provide estimates of the minimum cost of achieving current performance levels, and it is even more problematic to extrapolate the cost of achieving at higher levels.

Susanna Loeb, Anthony Bryk, Eric A. Hanushek. Getting Down to Facts: School Finance and Governance in California. Education Finance and Policy, 3(1), Winter 2008, pp. 1-19.

The purpose of this project was to describe California's school finance and governance systems, identify aspects of those systems that hinder the effective use of resources, and estimate costs of achieving a range of student outcome goals. The research documents what many educators report anecdotally: while good things are happening in many districts, schools, and classrooms, California's school finance and governance systems are fundamentally flawed and fail to help students meet state performance goals, especially students from low-income families. While meaningful reform will likely require added investment, it is also clear that absent reform, directing more money into the current system is unlikely to result in the dramatic improvements in student achievement needed to reach state goals. This research indicates that what matters most are the ways in which current and new resources are used.

8. b. Books

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

The United States now spends more per student on K-12 education than almost any other country. Yet American students still achieve less than their foreign counterparts; performance has been flat for decades, millions of them are failing and poor and minority students remain far behind their more advantaged peers. The principal focus of both courts and legislatures on ever-increasing funding has done little to improve student achievement. A new approach is proposed: a performance-based system that directly links funding to success in raising student achievement. This system would empower and motivate educators to make better, more cost-effective decisions about how to run their schools, ultimately leading to improved student performance.

8. c. Working Papers

Eric A. Hanushek, Kuzey Yilmaz. *Land Use Controls and the Provision of Education*. NBER Working Paper 17730, January 2012.

Considerable prior analysis has gone into the study of zoning restrictions on location choice and on fiscal burdens. This prior work – particularly on fiscal or exclusionary zoning - has provided both inconclusive theoretical results and inconsistent empirical support of the theory. More importantly, none of this work addresses important questions about the level and distribution of public goods that are provided under fiscal zoning. We expand the theoretical analysis to include the interaction between land use restrictions and the provision of public good. In this, we focus on schooling outcomes, since the provision of education is one of the primary activities of local authorities. The paper analyzes what the market effects of land-use controls are and how successful they are. The policies considered (minimum lot size zoning, local public finance with a head tax, and fringe zoning) demonstrate how household behaviour directly affects the equilibrium outcomes and the provision of the local public good.

Paul W. Glewwe, Eric A. Hanushek, Sarah D. Humpage, Renato Ravina. *School resources and educational outcomes in developing countries: A review of the literature from 1990 to 2010*. NBER Working Paper 17554, October 2011

Developing countries spend hundreds of billions of dollars each year on schools, educational materials and teachers, but relatively little is known about how effective these expenditures are at increasing students' years of completed schooling and, more importantly, the skills that they learn while in school. This paper examines studies published between 1990 and 2010, in education

and economics literature, to investigate which specific school and teacher characteristics, if any, appear to have strong positive impacts on learning and time in school. 79 studies are selected as being of sufficient quality. A higher bar is set in terms of econometric methods used, leaving 43 “high quality” studies. Finally, results are also shown separately for 13 randomized trials. The estimated impacts on time in school and learning of most school and teacher characteristics are statistically insignificant, especially when the evidence is limited to the “high quality” studies. The few variables that do have significant effects – e.g. availability of desks, teacher knowledge of the subjects they teach, and teacher absence – are not particularly surprising and thus provide little guidance for future policies and programs.

9. Other useful resources

Full versions of the papers included in this report and the papers published by Hanushek pre-2008 are available from his website: <http://hanushek.stanford.edu/publications/academic>.

10. Additional information

About Helpdesk reports: The HEART Helpdesk is funded by the DFID Human Development Group. Helpdesk reports are based on 2 days of desk-based research per query and are designed to provide a brief overview of the key issues, and a summary of some of the best literature available. Experts may be contacted during the course of the research, and those able to provide input within the short time-frame are acknowledged.

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