The Trade-Off between Excellence and Equality: What International Assessments Tell Us

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The advent of large-scale international assessments has generated a surge of interest in comparative educational research. The results of studies like the Third International Mathematics and Science Study (TIMSS) and the Program in International Student Assessment (PISA) have strongly influenced the agendas of both educational researchers and educational policymakers. The use of these assessments (or ILSAs) generally falls into two categories. The first uses the datasets to explore broad educational relationships that can inform educational policy. For example, the curriculum studies based on the TIMSS helped lay the intellectual foundation for the Common Core State Standards for Mathematics by identifying the key features of coherence, focus, and rigor in successful mathematics systems. The second approach focuses more exclusively on a high-performing country in order to understand—and imitate—its success. Over the last several decades, countries such as Japan, Singapore, and, more recently, Finland have attracted concentrated attention from researchers in other countries due to their high rankings on the TIMSS and/or PISA.[1]

Although generally in our own work we have used the first approach, there is much to be learned from an in-depth examination of a high-performing educational system. A rigorous case study approach can generate new insights and fresh theoretical perspectives. At a minimum, it reminds us that whatever underlying commonalities exist in how students learn mathematics, different countries have adopted sometimes radically different approaches to the same general problem: how to inculcate strong mathematical knowledge in every student, which is of pivotal importance in a technology-saturated global society. In this paper we examine this issue by first addressing how such high-performing nations should be chosen. We then propose the criteria by which to identify them, and using that approach we suggest a set of three particular countries to be studied in depth: two commonly identified ones, Japan and Finland, but another that has received much less attention, Canada.

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Identifying Countries for In-Depth Study

The methodology for identifying which countries are most appropriate for study requires more attention than it typically receives. It is of vital importance that researchers and policymakers have a well-thought-out model for identifying which educational systems may be worthy of imitation. To date, the regrettable tendency has been to simply pick the country at the top of the PISA or TIMSS league tables. Distressingly often, the results of a new international assessment lead to articles, books, and "policy tourists" converging on today's "winner" in the international testing horse race.[2]

This is a very dangerous habit. As Chung and Duru-Bellat have argued, one cannot simply pluck out some intriguing element of a high-performing country's educational system, transfer it to a profoundly different educational context, and expect good results.[3] Educational policies may be interlocking such that a combination of different characteristics—rather than the most noticeable one—produces the desired outcome. Furthermore, educational policies may be quite sensitive to a given cultural, economic, or social context: what works well in one setting may work poorly in another.

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The recent attention given to Finland is an excellent example of this general phenomenon. There are, of course, very high-quality studies undertaken in Finland whose findings may prove very useful to students of educational policy. However, one should admit that as a numerically small, ethnically homogenous, economically egalitar-ian social welfare state, Finland's socioeconomic context is somewhat different from the United States'. Furthermore, while it scores quite well on PISA, Finland's performance on the TIMSS is statistically indistinguishable from the United States'. As such, the prescription of a one-size-fits-all solution would be likely to fail. One could make a similar case for previous darlings of comparative education studies like Japan or Singapore.

Weighing Excellence vs. Equity

Ignoring different cultural and institutional contexts that distinguish countries from one another is one mistake; focusing exclusively on average academic achievement is another. Educational excellence is only one of the goals of educational policy—the other is educational equity. Theoretically, a country could have high mean scores because educational (and social) resources are disproportionately channeled to the most affluent sections in the society, leaving the less fortunate as a veritable underclass bereft of educational opportunities. This would hardly be an educational system worth imitating and certainly would not align with a commitment to equal opportunity for all.

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Now, there is an argument going back to at least Okun that there is a trade-off between equity and excellence.[4] In the case of education, the idea would be that by investing resources in students with more potential, or by capitalizing on a student's background advantages, a country can achieve higher

average educational performance—but only at the cost of greater inequality. The equity-efficiency trade-off in education has been contested by the likes of Freeman and, more recently, Schleicher.[5] In a 2014 Organization for Economic Co-operation and Development (OECD) report, the latter identified countries as high-achieving along both the high-achievement and high-equality dimensions.[6] Schleicher compared mean mathematics scores on the 2012 PISA to the proportion of variance in mathematics literacy explained by the PISA's index of economic, social, and cultural status (ESCS). Schleicher's analysis identified a group of countries that had both higher mean scores and more equity than the OECD average, a list which included among others Japan, Finland, and Canada.[7] In other words, there is reason to believe that a country's educational system can produce more equity and higher performance. It is those systems that deserve our attention.

Schleicher's approach of incorporating both the equity and achievement dimensions in searching for model systems is a sound one but open to elaboration. Schleicher's analysis considers the overall association between socioeconomic status (SES) and student performance without parsing out how much of the effect of SES is due to background social conditions and how much is related to schooling. However, research attests to the direct influence of poverty on a child's ability to learn as well as to the indirect influence of educational systems that exacerbate those disadvantages (e.g., tracking low-income children into low-quality schools or classrooms).[8] In seeking out new educational strategies, it is vital to distinguish between these two facets of inequality. Two countries could exhibit the same relationship between SES and academic performance, but one could have a fairly equitable society but a highly unequal

educational system, while the other could have sound policies for expanding opportunity but be faced with a large population of high-poverty students. Specifically school-based policies are the proper focus of educational policy researchers because they are far more amenable to educational policymakers and because education is only a small piece of the much larger system of social (in)equality in a given country, making it more conducive to meaningful reform.

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Measuring Inequality

Until recently, it has been quite difficult to separate direct and indirect SES effects using international data. One key method by which schools can influence educational inequality is through curricular differentiation, usually understood as disadvantaged groups being exposed to weaker educational content. Unfortunately, other than fairly blunt instruments (e.g., age at which students are first assigned to classes of varying rigor), there were few measures for comparing inequalities in opportunity to learn (OTL) across countries before 2012. The chief exception was the 1995 TIMSS, which surveyed teachers about the mathematics content offered to students. However, the TIMSS OTL items have been pared down steadily over time, and in any case the TIMSS samples only one or two classrooms per school, making within-school inequalities difficult to study.

By contrast, the latest PISA (2012) includes student-level indicators for OTL across sixty-two OECD and non-OECD educational systems. Using these data, Schmidt et al. demonstrated significant inequalities

in OTL between higher and lower SES students across countries.[9] Economically disadvantaged students were exposed to less rigorous mathematics content, likely exacerbating background inequalities. SES had a direct relationship with mathematics literacy as well as an indirect relationship through unequal exposure to content. In addition, the strength of these relationships *varied enormously across countries*. This variation suggests that inequality in OTL associated with student background may be due to differences in educational policy, and thus that some educational systems may have approaches to mitigating curricular inequality that are worthy of consideration in the United States.

Building on Schleicher et al. and Schmidt et al., we compared mean country PISA performance in mathematics to several different measures of inequality in the thirty-three OECD and twenty-nine non-OECD educational systems for which PISA data were available.[10] Measures of inequality were drawn from Schmidt et al.'s path analysis looking at the relationship of SES and OTL to PISA math performance. The results that follow use regression analyses. Our purpose is not to present a definitive list of countries that should serve as the object of U.S. researchers, but to outline a general approach we believe has promise but requires a great deal more detail.

We explored the following measures of educational inequality:

- Total SES effect (combining direct effect of SES on PISA scores and indirect effect of SES on math scores through the effect of SES on OTL);
- Direct SES effect (the coefficient of SES to PISA mathematics literacy, controlling for OTL);
- Indirect SES effect on PISA scores through the SES-OTL relationship;

- % Indirect (the proportion of total SES effect that was due to the indirect effect);
- SES-OTL (the estimated regression coefficient between SES and OTL);
- PerfGap (the difference in mean PISA scores between the top SES and bottom SES quartiles, with quartiles defined by the distribution of SES in each country);
- OTLGap (the difference in mean OTL between the top SES and bottom SES quartiles, defined as above);

Our results were also compared to Schleicher et al.'s analysis.

Results

In conducting our analysis, we explored two ways of classifying groups of countries: the first was by OECD and non-OECD status, the second by whether the country was a former communist nation. We found that lumping together all sixty-two educational systems may disguise important relationships. For example, in several iterations there were noticeable differences in the relationship between the various measures of educational inequality and average PISA performance between OECD and non-OECD countries (see Table 1). One likely reason is the greater average wealth and lower inequality typically found in OECD nations—although there are fairly wealthy systems like Singapore or Taiwan that are not part of the OECD. Future analysis should probably consider controlling for measures of economic inequality (e.g., GINI coefficients) and per capita income. A second major grouping is for former communist nations (or "transitional" economies). In general, academic performance and educational inequality were much more weakly related in these systems than in noncommunist systems. Jerrim and Macmillan (2014) found that in formerly communist nations, educational inequality

Table 1

Percent of Variance in Mean PISA Math Scores Explained, by Measure and Country Classification

	All	OECD	Non-OECD	Transitional	All Non-Transitional	OECD Non-Transitional
Tot SES	25%*	8%	26%*	0%	41%*	17%*
Direct SES	5%	1%	7%	*1%*	7%	2%
Indirect SES	26%*	22%*	27%*	11%	42%*	37%*
SES OTL	5%	12%	0%	9%	21%*	25%*
% Indirect	16%*	19%*	13%	1%	26%*	32%*
PerfGap	6%	*1%*	6%	*0%*	13%*	*0%*
OTLGap	0%	0%	3%	9%	1%	3%

*Statistically significant at .05 level.

Note: Numbers in italics indicate a negative association between variables.

was only weakly related to average economic mobility across generations.[11] Although it is unclear whether these differences are due more to educational, economic, or political factors, there is clearly a significant gap between countries on opposite sides of the Cold War divide.

Regression analyses suggest that there is *not* a clear trade-off between educational inequality and academic performance, particularly in OECD countries. Although the relationship between indirect SES effects and performance is associated with higher mean scores—whereby educational resources are disproportionately bestowed upon students from high-SES backgrounds—this relationship only accounts for about one-fourth of the variation in mean mathematics literacy. Furthermore, there is virtually no relationship between the gaps in performance or OTL between higher and lower SES groups and a country's average academic achievement. Essentially, our

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Because our principal focus is on countries that may provide useful lessons for U.S. scholars and policymakers, in our follow-up analyses we chose to concentrate on the twenty-seven OECD nations that never adopted Communism. A summary of these results can be found in Table 2, which includes all non-transitional OECD countries with above-average PISA performance and above-average equity (by any metric). Countries labeled with an "x" were those that had higher-than-average PISA performance and lower-than-average inequality on a given measure of equality. What is striking about these results is the consistency with which two countries have managed to combine relatively high equity and strong mathematics achievement: Finland and Canada do well along all eight measures. Japan also does quite well, achieving six of the eight. In one sense, the research focus on Japan and Finland is well supported, since these countries not only rank near the top of the PISA but also manage to provide fairly robust equality of educational opportunity.

Table 2
Countries with Higher PISA Math Scores and Lower Inequality

	Total SES	Direct SES	Indirect SES	% Indirect	SES-OTL	PerfGap	OTLGap	% Variance
Australia		x						x
Austria		x						
Canada	x	x	x	x	x	x	x	x
Denmark	x		x				x	
Finland	x	x	x	x	x	x	x	x
Germany		x						
Ireland	x	x					x	
Japan		x		x	x	x	x	x
Korea		x					x	x
Netherlands	x	x				x		x
Switzerland			x			x		x

Policy Implications

However, despite these undeniable achievements, there are reasons to wonder how easy it would be to translate Finland's or Japan's educational policies to the dramatically different context of the United States. By comparison, Canada is in many respects the country that most resembles the United States along many different dimensions. Both are predominantly English-speaking countries with large immigrant populations and substantial ethnic and linguistic diversity. Both the United States and Canada are geographically dispersed, and both have institutional structures that decentralize educational authority to the provincial/state or local level. Both have generally laissez-faire economies. And as a practical matter, Canada's close geographic proximity to the United States would make cross-border research and cooperation much easier (and cheaper) than the long-distance trips to non-English-speaking Japan or Finland. Although we certainly do not suggest ignoring other high-performing, high-equity countries, it is puzzling that Canada has not received much more attention from education scholars and policymakers.

Despite the United States' and Canada's similar social and economic characteristics, they have very disparate educational outcomes—outcomes that may be the product of different educational policies. It would be very worthwhile, therefore, to examine differences in school structure, personnel policies, teacher training, et cetera. For example, teachers in Canada (and in many other OECD countries) are substantially better paid relative to other college-educated professionals and devote a smaller share of their hours to classroom instruction than their US counterparts.[12] Canada's success may also raise questions about some proposed educational reforms—for example, Canada has fairly strong teachers unions, whereas teacher collective bargaining in the United States has come under serious criticism from policymakers and some researchers. US researchers should explore whether these differences contribute to Canada's superior performance. These suggestions are purely speculative, however, and we need a great deal more information than we presently have to properly assess what we might learn from Canada. Our main point is that, given its similarities to the United States in other respects, innovations identified in Canada might be more easily transferred to US schools than innovations of other countries.

Finally, the fact that different countries

rank as "high equity" on some measures of inequality and not on others raises intriguing questions about not only the relationship of equity to achievement but also the structure of education. For example, Japan, Korea, and Ireland have smaller OTL gaps between the richest and poorest students yet larger-than-average indirect SES effects through OTL, a situation that appears somewhat contradictory on the surface and requires careful exploration. In addition, these findings suggest that four high-performing countries—Australia, Austria, Germany, and Korea—have greater-than-average educational inequality that is mostly due to their school systems. All four actually experience relatively small direct effects from social background but a stronger-than-average link between socioeconomic background and school-driven inequality.

Cross-country comparisons of equity and achievement can therefore generate entirely new areas of research by identifying countries whose profiles challenge our preconceptions. Incorporating measures of performance and equality into their assessments of educational systems can help researchers and policymakers make more informed choices in selecting potential models. Our tentative first step in that direction suggests that in some respects the most common objects of study, in fact, deserve our attention by achieving both high performance and greater equity, but that other systems—Canada in particular—warrant more focus than they have received to date.

Notes

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