

9 Building Blocks For a World-Class Education System



CENTER ON INTERNATIONAL
EDUCATION BENCHMARKING
LEARNING FROM THE WORLD'S HIGH PERFORMING EDUCATION SYSTEMS

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Preface

The *9 Building Blocks for a World-Class Education System* is a distillation of more than 25 years of research conducted on the world's best education systems by the National Center on Education and the Economy. Our goal in conducting this research was to identify the strategies those countries used to outperform the United States in the hope that American policymakers could use that research to improve the performance of our own system.

Our Process for Selecting Jurisdictions to Study

When we began this work in 1989, we were looking for countries that significantly outperformed the United States on average student achievement, equity and efficiency, which is to say that we were looking for countries where average measured student achievement was exceptionally high; differences in results within schools, among schools and between average students and minority and low-income students were low; and taxpayers were getting good value for their money. Those metrics continue to define the system outcomes we look for.

When we started, there was very little good data on which to base our choice of countries. That changed for student performance in mathematics and science when the International Association for the Evaluation of Educational Achievement (IEA) first issued the Trends in International Mathematics and Science Study (TIMSS) report in 1995. However, since the Organisation for Economic Cooperation and Development (OECD) released the first Programme for International Student Assessment (PISA) study in 2000, we have used that data as the bases of our

selection of top performers for study. That is because PISA covers more of the highly industrialized countries to which the United States is usually compared, because PISA covers more subjects than TIMSS, and because PISA is designed to find out not just how students performed on a consensus curriculum, but how well they can apply what they have learned in school to the kinds of problems they will encounter in the workplace and elsewhere outside school.

Specifically, we focus our research on the changing set of very large jurisdictions (countries, states and provinces) that place among the top 10 on the PISA league tables. This is not because there is a statistically significant difference between the top ten and those that just missed the cut—that is not the case—but because we do not want to be accused of cherry-picking the top performers in the service of a pre-determined agenda.

It is important to point out that most of the top-performing countries we have studied are often the size not of the United States, but of the average state within the United States. Our aim has been to provide research that individual states can use to match the performance of the best countries in the world.

A Focus on System Coherence and Performance

Why this focus on large-scale systems? Because, as we see it, research on the comparative performance of entire education systems is now the most important of all topics in education research. The steady advances in the global integration of labor markets has put the workers of all nations in direct competition with the workers of all the other labor markets, and

advances in the automation of work have resulted in increasing competition between machines and people for the available jobs. These two forces are combining in high-wage countries to greatly reduce the available jobs for people with the kinds of skills that, for a century or more, were more than adequate to support middle class families and greatly increase the demand for workers who have the knowledge and skills characteristic of professionals. Countries that redesign their education systems to adapt to this new reality will enjoy high standards of living and sustained political stability. Those that fail to do so, especially high-wage countries like the United States, will experience steadily widening income disparities, problems competing with other countries, and growing political instability.

It is for these reasons that we have focused on the way entire education systems work. Education systems are not simply collections of independently effective parts and pieces. Effective systems, by definition, are collections of parts and pieces that work in harmony with one another, each one reinforcing and supporting the functioning of the other parts and pieces, and all of them together contributing in a positive way to the outcomes for which the system was designed.

When we look at the United States this way, what we see is almost unique in the developed world. Visitors come from every corner of the globe to see the “peaks of excellence” in U.S. schools. But they do not come to see an effective system. People with great ideas can be found here, as can many practices well worth taking home. But the brilliant ideas and highly effective programs they spawn rarely effect more than a handful of students and are often implemented

under policies and in the company of practices that do not foster their growth or even survival. So visitors do not come to the United States to learn how to build an effective education system.

This inability to develop highly effective systems at scale is in part a result of the highly fractured system of education governance in this country. Many actors who do not report to one another and who often have very different and even conflicting ideas about what ought to be done make decisions that result in often conflicting and frequently perverse incentives facing teachers, students, school administrators and others in our education system. That is not what we see when we look at the top-performing countries.

Our Methodology is Designed to Support Adaptation — Not Wholesale Adoption — of Policies

Much of the research on education in the United States is intended to enable policymakers and practitioners to identify the most effective policy or practice for any given purpose in a given context or range of contexts. Users of that research are then expected to copy or replicate the policy or practice as they implement it, because, to the extent that the implemented policy or practice deviates from what was researched, the results that the user gets will not be those that the researcher observed.

That research model cannot be used to study large-scale systems, nor would it be desirable to do so even if it were possible. To establish conclusively that one form of education system produces consistently superior results for all populations of interest, according to the dominant model of education

research, one would have to randomly assign national systems of education to national populations. But it is patently impossible to announce one day that the population of Sweden will use the Singaporean system of education and Singaporeans will use British Columbia's system.

On a related point, one cannot take a key part of a well-functioning system, install it in a dysfunctional system, and expect it to produce the same results it produced in the well-functioning system. For example, if one were to take several common features of initial teacher preparation systems in high-performing education systems—say, greatly raising standards for admission to teachers colleges, selecting students from the top half of the distribution of high school graduates, moving the function of teacher education into the state's research universities—and implement those policies in the typical American state while doing nothing to increase the attractiveness of a career in teaching to very capable high school graduates, the only effect would be to dry up the supply of candidates for admission to teachers colleges, thereby producing a massive teacher shortage.

But there is a deeper problem here. Officials who run states and state education systems are simply not interested in copying any other system. They know their own context will be different in important ways from the systems the researchers studied. They will have their own politics to deal with. The people of their state will have their own values and aims. They will face challenges the researched country did not face.

Because leaders are not interested in copying anyone, a research model that is designed to specify a model an adopter is supposed

to copy whole hog will not work. The decision maker instead wants information that can be used to design that state's own model, drawing on the experience of a variety of top-performing jurisdictions. That involves, at its best, a creative process in which the system designer puts parts and pieces together, often coming from different systems that he or she thinks will work in harness with each other. The designer knows that the likelihood that those parts and pieces will work well together will increase if the parts and pieces are designed on common principles. Those parts and pieces will have to be compatible not just with each other, but with the culture, history and politics of the state for which the design is being made. There will be no implementation unless stakeholders from many corners of the state help shape the design. The state will come up with its own 'secret sauce' to add to the parts and pieces that were derived from the study of top-performing systems.

What I have just described is based on an approach to systems design developed by global American manufacturing companies in the late 1970s. At that time, U.S. companies were being bested by Japanese firms using methods that enabled them to produce higher-quality products at lower prices than their American competitors and do it in less time than it was taking for the American firms to bring their products to market. Doing this kind of research well requires a complex, demanding approach. They, too, were not interested in copying anyone; their aim was to create manufacturing processes that would enable them to do even better than the Japanese. To do that, they would have to fully understand what their competitors were doing and do it even better, in part

by combining the best ideas of many competitors with each other and with their own ideas. The research on which the *9 Building Blocks* is based was done in this style of industrial benchmarking.

It follows that there is no country, state or province anywhere that is doing all of the *9 Building Blocks* perfectly as we describe in this document. They are a composite picture, drawn from our research to present an image of what a very high-performing system might look like if it were based on the best we have seen over the last quarter century, put together in a very coherent, internally consistent system, based on a consistent set of principles that inform all of the building blocks.

Why You Can Rely on Our Methods of Research and Analysis

Though we cannot with any precision say that a specific feature of the *9 Building Blocks* accounts for this or that proportion of the high achievement, equity or efficiency of a particular system, we are very confident that any country that does a good job of implementing the composite design represented by the *9 Building Blocks* will have a high-performing system. That is because

- 1) the principles underlying the design can be found underlying the designs of all the top performers, irrespective of national culture, history or politics;
- 2) when we look at American states, the ones at the top of the National Assessment of Educational Progress (NAEP) league tables look more like this composite picture than states that are not at the top of those league tables;
- 3) on the whole, the jurisdictions at the top of the PISA league tables have policies and practices more like those

in the *9 Building Blocks* composite than American states, which typically perform at substantially lower levels; 4) countries that were not among the top performers that then joined their ranks are countries that have adopted policies and practices in the *9 Building Blocks* along the way; and 5) countries that were once among the PISA top performers, but subsequently dropped out of those ranks, are typically countries that have dropped policies and practices that are covered in the *9 Building Blocks* or introduced other policies that conflict with them. It is true that correlation is not causation, but when you put all these facts together, they constitute, we think, a strong argument for using the *9 Building Blocks* as a framework for state education reform.

It is important to observe that the *9 Building Blocks* rest not just on the industrial benchmarking methodology described above, but also on a close reading of the data that OECD has gathered using the data from the full PISA survey. This is all correlational data, but it is very powerful. We know from it, for example, that there is no correlation between national expenditures on instructional technology and student performance; or between class size and student performance, except for students in the early grades. We know that schools in the United States do a much poorer job of enabling poor and minority students to move up the social and economic ladder than schools in most other industrialized countries. This kind of data and the analysis that goes with it is invaluable, because it both points to issues that need attention and calls into question the validity of long-held beliefs.

But correlational data of this sort cannot tell the policymaker or practitioner what

educational aims the leaders of a country had, what policies it formed to achieve them, what challenges presented themselves when they tried to implement those policies, how they responded when new problems and new opportunities arose and so on. A good deal of our research focuses on points like these, points that we think are essential for policymakers to understand and learn from to develop their own reform strategies. Over the years, we have gotten ever better at formulating such questions and getting good answers to them, just as the industrial benchmarkers did when American manufacturing firms were attacked.

What's at Stake

The long-term results from the NAEP show no change at all in the scores of American high school students since the survey began

more than 40 years ago. In the meantime, nearly 30 countries have overtaken the United States in achievement and equity, many by wide margins, even though the United States spends more per student than all but a handful of other industrialized countries.

Our states will either choose to learn from the countries, states and provinces that are far ahead on the global stage, or watch their citizens struggle ever harder to make ends meet and face the growing political instability that will inevitably follow as we fail to give our workers the skills they need to be competitive. We offer this analysis of the strategies used by the top performers in the hope that it will be useful to the states that choose to meet the challenges presented by a greatly changed global economy and swiftly evolving digital technologies.

Marc Tucker

9 Building Blocks for a World-Class Education System

1. Provide strong supports for children and their families before students arrive at school

- Countries in which young children who come to school healthy, eager to learn and ready to profit from the instruction tend to be countries in which those children do well in school.
- Most strong performers have extensive government supports for prenatal care, mother and child nutrition, universal health care, high-quality childcare for working mothers, high-quality preschools and family allowances for families with young children. Countries with higher proportions of women in the paid workforce tend to have the strongest government supports for families with young children.

2. Provide more resources for at-risk students than for others

- Top-performing countries have made explicit decisions to create systems in which all students are educated to standards formerly reserved only for their elites.
- Policymakers in these countries know that if less-advantaged students are going to achieve at league-leading levels they will have to have access to more resources than students who come to school with greater advantages.
- Most of the top-performing countries provide more teachers to harder-

to-educate students. Some are even providing strong incentives to their best teachers to work in classes and schools serving students from low-income and minority families.

3. Develop world-class, highly coherent instructional systems

- Top-performing systems typically have well-developed, highly coherent and very demanding instructional systems for all students that incorporate student performance standards, curriculum and assessments, as well as the use of instructional methods appropriate to the goals and standards of instruction.
- Top-performing countries are constantly benchmarking their standards, curricula and assessments to other leading countries.
- The standards might be expressed as stand-alone statements about what students should know and be able to do or might be incorporated in syllabi for courses, which would include all the courses in the core curriculum as well as the native language, (almost always) English, sometimes other foreign languages, mathematics, the sciences, technology, their own history, world history, often geography, music and the arts, and physical education.
- In top-performing countries, the standards for these courses typically emphasize the acquisition of
 - A wide range of complex knowledge,

- Deep conceptual understanding of the subjects studied,
- The ability to write well,
- The ability to synthesize material from many disciplines to address real-world problems, and
- Strong analytical capacity and creative and innovative capacity.
- Ministry officials develop strong curriculum frameworks designed to specify in some detail what topics are to be taught at which grade levels, subject-by-subject and grade-by-grade.
- Though schools are expected to create their own lesson plans, the state provides extensive guidance and curriculum support for teachers. Textbooks follow that guidance closely.
- Top-performing systems typically develop one to three summative assessments to be taken by students over the whole course of their school career, taken by all students. These are usually in the form of examinations requiring students to respond with essays, or, in the case of mathematics, by showing how they went about solving multi-step problems.
- No top-performing country relies primarily on computer-scored, multiple-choice tests because they do not believe such tests can adequately test for acquisition of the high-level cognitive skills they are aiming for.
- Summative assessments are typically used to hold students, not teachers, accountable for their performance; the

options available to students as they proceed with their education or enter the workplace are significantly affected by their performance on these exams.

- Scores by school are widely published.
- The content of the entire examination is typically made public after the exam is given. Also, examples of high-scoring student work are made public in order to provide guidance to teachers and students in the future as to what kind of student work will win high scores.
- In some countries, low scores for schools result in visits from expert principals and teachers who develop recommendations to improve the performance of the school.

4. Create clear gateways for students through the system, set to global standards, with no dead ends

- Instead of issuing a high school diploma—essentially a certificate of attendance—top-performing countries issue qualifications showing what high school courses the holder has taken and the grades earned in those courses.
- Because the state has specified the content of the courses and because the exams are developed and administered by the state, not the school or district, everyone knows just what the student has accomplished.
- Students are highly motivated to take the necessary courses and do well in them, whether they want to be a brain surgeon or an auto mechanic.

- Countries with well-developed qualifications systems have arranged them into pathways such that an individual can always go back later and pick up a qualification that he or she missed earlier.
- Successful systems have no dead ends; all paths can be linked up to others so that students can always go further in their education without having to start at the beginning.
- The qualification students receive at the end of a course of study is their ticket of admission to the next stage of their education.

5. Assure an abundant supply of highly qualified teachers

- The top-performing countries believe it will be impossible to deliver to all their students the kind and quality of education formerly reserved for their elites unless they are able to put a very highly qualified teacher in front of all their students.
 - Top-performing countries recruit their teachers from the top ranks of high school graduating classes, most in the top third to top quarter, or, in some cases, the top five percent.
 - Admissions screens are rigorous and comprehensive and take into account:
 - Academic qualifications (class rank, grades, scores on admissions exams)
 - Ability to relate well to students (sometimes through observation)
 - Passion for teaching (through interviews with expert educators)
- The ratio of applicants to acceptances for entrance into teacher education institutions can be as high as 10 to one.
- A growing number of countries are limiting access to approved programs of teacher education to those offered only by their research institutions.
 - Top performers develop very rigorous requirements for mastery of the subject matter the prospective teacher will teach.
 - At least a year is given over to mastery of the craft of teaching, either during teacher preparation or the first year of employment as a new teacher serves as an apprentice of a Master Teacher.
 - The top-performing systems do not allow, much less encourage, “alternative routes” into teaching that bypass these rigorous requirements.
 - Teachers in preparation programs are required to study research methods, enabling them to determine the effectiveness of their own work developing and implementing improved curriculum, instruction and assessment in their schools.
 - Instruction for these prospective teachers is emphasized in both diagnosis and prescription as a key part of the teacher preparation curriculum to identify why students are not learning and developing strategies to address the causes.

- Top performers monitor demand for teachers and control supply to assure the efficient provision of first rate teachers in all needed areas.
- Beginning teacher compensation is set to make teaching competitive with high status professionals.
- Very aggressive career ladders are created that increase compensation, responsibility, authority and autonomy, and higher status as teachers progress through their careers.
- Teachers at the upper levels of the teacher career ladder:
 - Serve as mentors to new teachers and others lower on the ladder
 - Identify areas in which the curriculum and instruction methods need to be improved
 - Lead teams in the process of researching and then developing improved curriculum, lessons, materials and formative assessment techniques.

6. Redesign schools to be places in which teachers will be treated as professionals, with incentives and support to continuously improve their professional practice and the performance of their students

- Improving the competence of currently serving teachers is a priority as depending solely on newly trained teachers results in delayed improvement.
- Career ladders are created that develop the skills of the current teacher workforce and establish a culture and organization that provides strong incentives for teachers to get better and better at the work and supports continuous improvement of the school as a whole.
- The career ladders have multiple levels, each level of which is broken down into several steps. All except those at the top of the career ladders have teacher mentors.
- Teachers constantly observe each other's teaching; demonstrate new lessons to their colleagues; critique these lessons; revise them; and implement them once they have demonstrated their worth.
- Teachers meet regularly by grade and by subject to participate in all these processes. The research, development, trial, revision and evaluation process is very disciplined and highly collegial.
- Professional development is an integral part, indeed a result, of how the work of the school gets done. There is wide access to workshops for professional teachers, but this is not a workshop model of professional development.
- The integrity of the whole system depends on the creation of powerful career ladders, which in effect define what it means to have a career in teaching and create an environment in which teachers come to be treated as leaders and as professionals.

- Staffing ratios are similar to those in other countries, but class sizes tend to be larger in the top performers, which makes time—typically 40 percent of the school day—available to teachers to work with one another in teams to design and implement interventions intended to improve the performance of their school and students.
- Teachers use teaching methods that require large class sizes to develop students' deep understanding of the subject they are studying.
- Staffing ratios are modestly higher in schools serving students from disadvantaged backgrounds and slightly lower in schools serving others.
- Quality training is offered that embeds modern technical skills on state-of-the-art equipment at the hands of teachers and mentors who are deeply versed in the most up-to-date equipment and practices.
- VET students study in settings that have all the attributes of real industry settings, or are offered an opportunity to study in real industrial settings, or both. Students receive a training wage that is increased as their value to their employer increases but is set at a level that makes it attractive for employers to offer apprenticeships.
- Skill standards reflect the state-of-the-art in the industries being trained for and a high level of investment in the education and training of the students.

7. Create an effective system of career and technical education and training

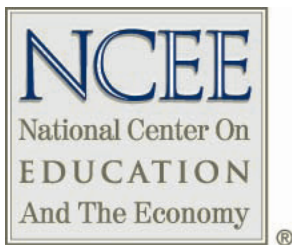
- Healthy, competitive economies that support broadly shared prosperity depend upon an effective system of vocational education and training (VET).
- VET systems risk collapse when enrollment is below 40 percent of all students. Below that point, it is increasingly likely that the VET system will be viewed as a system of last resort for students who have no other option.
- Successful VET systems have no dead ends; they offer viable routes for students enrolled in VET programs to acquire the additional education and training they will need to work in the professions and in senior management if that is what they aspire to.
- The demand of industry for skilled workers in the industries served by the system is matched with the supply being produced.
- Industry is encouraged to involve itself in the provision of the up-to-date equipment and training staff needed to make the system work; the slots available to train students are sufficient to provide apprenticeships to all who need and want them.
- There are standards that employers must meet to offer apprenticeships that guarantee that students will receive the education and training needed to meet agreed industry standards; industry associations provide those services that individual firms cannot.

8. Create a leadership development system that develops leaders at all levels to manage such systems effectively

- Successful systems identify and develop leaders who can
 - Get broad agreement on demanding goals for both the students and the staff,
 - Create and successfully implement effective strategies for achieving those goals,
 - Recruit a highly capable staff, and
 - Organize and manage the school in a way that is designed to incentivize that staff to get better and better at the work and to provide the resources they need to do that, and
 - Create a culture in the school founded on the belief that all students can achieve at high levels of performance, whatever it takes.
- Successful systems seek out and develop school leaders with a combination of strategic skills, self-knowledge, patience, drive, management skill, ethical roots, moral qualities and a strong command of what is known world-wide about managing professionals for high performance.
- Top-performing systems typically:
 - Limit access to the principalship to people who have proven themselves highly effective teachers;
 - Work hard to build a deep pool of candidates for principal positions by grooming capable teachers who appear to have strong leadership potential; they groom them for the principal positions by offering them a succession of progressively demanding opportunities to lead teacher teams in the school;
 - Train principals entirely on the job or in a combination of formal training and on-the-job training, but the training always involves a clinical experience and mentoring by a successful school leader;
 - Provide new school principals with access to a group of experienced peers and mentors who support them in their career growth, guide them toward professional learning opportunities aligned to their aspirations, and help them realize their personal goals and goals for the growth of their students;
 - Provide strong incentives for especially effective principals to take responsibility for mentoring less successful principals; in some cases, the most successful principals are asked to take responsibility for providing guidance to the principals of more than one low-performing school; and
 - Provide principals with opportunities to regularly visit other schools in their district, state or province, and even abroad, in order to learn about successful practices in those schools, districts and countries and adapt their own leadership practice accordingly. This practice is intended to keep leaders learning continuously and to promote a benchmarking culture.

9. Institute a governance system that has the authority and legitimacy to develop coherent, powerful policies and is capable of implementing them at scale

- To develop a modern, high-performance education system with high and internationally competitive levels of student performance and high levels of equity at reasonable cost depends on having an institution comparable to a typical ministry of education in a high-performing country.
- In top-performing systems, either at the state or national level, there is a place where the buck stops that has responsibility for all policymaking or management functions directly related to education and can be held accountable for the design and functioning of the system as a whole.
- In effective systems, education professionals in the ministry are responsible for planning and proposing policies that can then be debated by the responsible elected officials, and are then responsible for carrying out the decisions their legislatures make.



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