Strong performers and successful reformers in education

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Andreas Schleicher
The dilemma for educators

The kinds of things that are easy to teach and test are also easy to digitise, automate and outsource.
The modern world no longer rewards people just for what they **know**, but for what they can **do** with what they know

Most teachers value 21st century pedagogies...

Percentage of lower secondary teachers who "agree" or "strongly agree" that:

- My role as a teacher is to facilitate students’ own inquiry
- Students should be allowed to think of solutions to practical problems themselves before the teacher shows them how they are solved
- Thinking and reasoning processes are more important than specific curriculum content
- Students learn best by finding solutions to problems on their own
...but teaching practices do not always reflect that

<table>
<thead>
<tr>
<th>Teaching Practice</th>
<th>Italy</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present a summary of recently learned content</td>
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<tr>
<td>Check students' exercise books or homework</td>
<td></td>
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<td>Refer to a problem from everyday life or work to demonstrate why new knowledge is useful</td>
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<td>Let students practice similar tasks until teacher knows that every student has understood the subject matter</td>
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<tr>
<td>Students work in small groups to come up with a joint solution to a problem or task</td>
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<tr>
<td>Give different work to the students who have difficulties learning and/or to those who can advance faster</td>
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<td>Students use ICT for projects or class work</td>
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<tr>
<td>Students work on projects that require at least one week to complete</td>
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</table>
Assessing equity and excellence
PISA in brief

• Over half a million students...
  – representing 28 million 15-year-olds in 65 countries/economies

... took an internationally agreed 2-hour test...
  – Goes beyond testing whether students can reproduce what they were taught...
  – to assess students’ capacity to extrapolate from what they know and creatively apply their knowledge in novel situations
  – Mathematics, reading, science, problem-solving, collaborative skills, global competencies
  – Total of 390 minutes of assessment material

... and responded to questions on...
  – their personal background, their schools and their engagement with learning and school

• Parents, principals and system leaders provided data on...
  – school policies, practices, resources and institutional factors that help explain performance differences.
• **Key principles**
  - ‘Crowd sourcing’ and collaboration
    • PISA draws together leading expertise and institutions from participating countries to develop instruments and methodologies...
      ... guided by governments on the basis of shared policy interests
  - Cross-national relevance and transferability of policy experiences
    • Emphasis on validity across cultures, languages and systems
    • Frameworks built on well-structured conceptual understanding of academic disciplines and contextual factors
  - Triangulation across different stakeholder perspectives
    • Systematic integration of insights from students, parents, school principals and system-leaders
  - Advanced methods with different grain sizes
    • A range of methods to adequately measure constructs with different grain sizes to serve different decision-making needs
    • Productive feedback, at appropriate levels of detail, to fuel improvement at every level of the system.
Mean score...Shanghai-China performs above this line (613)

High mathematics performance

Singapore
Chinese Taipei
Hong Kong-China
Korea
Macao-China
Japan
Liechtenstein
Switzerland
Netherlands
Estonia
Finland
Canada
Poland
Belgium
Germany
Viet Nam
Austria
Australia
Ireland
Slovenia
Denmark
New Zealand
Czech Republic
France
United Kingdom
Iceland
Australia
Ireland
United Kingdom
Norway
Italy
Russia
Sweden
Croatia

Low mathematics performance

Chile
Mexico
U.A.E.
Kazakhstan
Thailand
Malaysia

12 countries perform below this line
Mean score: Shanghai-China performs above this line (613)

...12 countries perform below this line
Socially equitable distribution of learning opportunities

High mathematics performance

Singapore
Hong Kong-China
Korea
Macao-China
Japan
Liechtenstein
Switzerland
Netherlands
Estonia
Finland
Canada
Viet Nam
Liechtenstein
Switzerland
Netherlands
Estonia
Finland
Canada
Viet Nam

Average performance of 15-year-olds in mathematics

Singapore
Hong Kong-China
Korea
Macao-China
Japan
Liechtenstein
Switzerland
Netherlands
Estonia
Finland
Canada
Viet Nam

Strong socio-economic impact on student performance

Low mathematics performance

New Zealand
Czech Republic
Luxembourg
Portugal
Slovak Republic
United States
Hungary
Israel
Greece
Romania
Serbia
Turkey
Bulgaria
U.A.E.
Kazakhstan
Thailand
Malaysia
Mexico

Socially equitable distribution of learning opportunities
2012

Socially equitable distribution of learning opportunities

Strong socio-economic impact on student performance
Strong socio-economic impact on student performance

Socially equitable distribution of learning opportunities
2003 - 2012

Germany, Turkey and Mexico improved both their mathematics performance and equity levels.

Brazil, Italy, Macao-China, Poland, Portugal, Russian Federation, Thailand and Tunisia improved their mathematics performance (no change in equity).

Liechtenstein, Norway, the United States and Switzerland improved their equity levels (no change in performance).

Chile 2001

Turkey 2003
The country where students go to class matters more than what social class students come from
Resilience in education
PISA performance by decile of social background

Source: PISA 2012
Lessons from high performers

Catching up with the top-performers

- Must haves
  - High impact on outcomes
  - High feasibility
  - Money pits

- Quick wins
  - Low feasibility
  - Low hanging fruits
  - Low impact on outcomes

- Low feasibility
  - Critical feasibility
  - Low impact

- High feasibility
  - Quick wins
  - High impact

- Money pits
  - Critical feasibility
  - High impact

- Low hanging fruits
  - Low feasibility
  - Low impact

- Lessons from high performers

- High impact
  - Critical feasibility
  - Money pits

- Low impact
  - Critical feasibility
  - Money pits
Lessons from high performers

- High impact on outcomes
  - Must haves
    - Commitment to universal achievement
  - Quick wins
    - Resources
      - where they yield most
        - Gateways, instructional systems
        - Incentive structures and accountability
      - A learning system
        - Resources ((where they yield most)
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          - Incentive structures and accountability
        - A learning system
          - Money pits
            - Low feasibility
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- Capacity
  - at point of delivery

- Coherence
Lessons from high performers

- A commitment to education and the belief that competencies can be learned and therefore all children can achieve
  - Universal educational standards and personalization as the approach to heterogeneity in the student body...
  - ... as opposed to a belief that students have different destinations to be met with different expectations, and selection/stratification as the approach to heterogeneity
  - Clear articulation who is responsible for ensuring student success and to whom
Countries where students have stronger beliefs in their abilities perform better in mathematics

Fig III.4.5

R² = 0.36

Mean mathematics performance vs. Mean index of mathematics self-efficacy
Perceived self-responsibility for failure in mathematics

Percentage of students who reported "agree" or "strongly agree" with the following statements:

- Sometimes I am just unlucky
- The teacher did not get students interested in the material
- Sometimes the course material is too hard
- This week I made bad guesses on the quiz
- My teacher did not explain the concepts well this week
- I’m not very good at solving mathematics problems

Fig III.3.6
Boys tend to have greater beliefs in their mathematics abilities than girls.

Fig III.7.7

Mean index difference (boys-girls)
Greater self-efficacy among girls could shrink the gender gap in mathematics performance, particularly among the highest-performing students.
Percentage of girls and boys who intend to take additional mathematics, rather than language, courses after they leave school

Girls ▲ Boys

0 10 20 30 40 50 60 70 80 90

Turkey * Jordan * Costa Rica * Thailand * Iceland * China * Indonesia * Portugal * Chile * Mexico * Peru * Uruguay* Argentina * Spain * France * Italy * Sweden * Netherlands * Latvia * Estonia * Lithuania * Bulgaria * Cyprus * Greece * Hungary * Romania * Serbia * Korea

Shanghai-China * Vietnam * Iceland * Kazakhstan * Croatia * Iceland * China * Thailand * Jordan * Turkey * Costa Rica * Costa Rica

OECD average

United States * Canada * Singapore * Estonia * China * Japan * Mexico * Tunisia * Peru * Mexico * Peru * Mexico * Peru
A continuum of support

Make learning central, encourage engagement and responsibility

Be acutely sensitive to individual differences

Provide continual assessment with formative feedback

Be demanding for every student

Ensure that students feel valued and included and learning is collaborative
Clear ambitious goals that are shared across the system and aligned with high stakes gateways and instructional systems

- Well established delivery chain through which curricular goals translate into instructional systems, instructional practices and student learning (intended, implemented and achieved)
- High level of metacognitive content of instruction...
Lessons from high performers

1. Money pits (Low impact on outcomes)
2. Low hanging fruits (Low feasibility)
3. Quick wins (High feasibility)
4. Must haves (High impact on outcomes)

Capacity at the point of delivery

- Attracting, developing and retaining high quality teachers and school leaders and a work organisation in which they can use their potential.
- Instructional leadership and human resource management in schools.
- Keeping teaching an attractive profession.
- System-wide career development.
Teacher shortage

Fig IV.3.5

Mean index

Luxembourg > Jordan > Thailand > Turkey > Shanghai-China > Colombia > Peru > Chile > Netherland > Mexico > Germany > Viet Nam > Russia Fed. > Uruguay > Norway > Kazakhstan > Indonesia > Belgium > Italy > Malaysia > Australia > Brazil > Ireland > U.A.E. > Singapore > New Zealand > Switzerland > Spain > Costa Rica > Sweden > Argentina > Tunisia > Austria > Qatar > Ireland > China > Taiwan > France > Denmark > United Kingdom > Hong Kong-China > Canada > Japan > Czech Republic > Greece > United States > Slovak Republic > Latvia > Portugal > Bulgaria > Poland

Mean index

Top quarter of this index

Bottom quarter of this index

Mean index
Adequate resources to address disadvantage

A shortage of qualified teachers is more of concern in disadvantaged schools

Mean index difference

Disadvantaged schools reported more teacher shortage

Advantaged schools reported more teacher shortage

Difference between socio-economically disadvantaged and socio-economically advantaged schools
Teachers' perceptions of the value of teaching

Percentage of lower secondary teachers who "agree" or "strongly agree" that teaching profession is a valued profession in society

Above-average performers in PISA
Countries where teachers believe their profession is valued significantly correlate with higher levels of student achievement.

Relationship between lower secondary teachers' views on the value of their profession in society and the country's share of top mathematics performers in PISA 2012.

\[ R^2 = 0.24 \quad r = 0.49 \]
Percentage of lower secondary teachers who report doing the following activities at least once per month

- Discuss individual students
- Share resources
- Team conferences
- Collaborate for common standards
- Team teaching
- Collaborative PD
- Joint activities
- Classroom observations

The graph shows the percentage of teachers engaged in various collaborative activities.
Drivers of job satisfaction

The more frequently that teachers report participating in *collaborative practices* with their colleagues, the higher their level of *self-efficacy*.

The same is true for *job satisfaction*.
Teachers' needs for professional development

Percentage of lower secondary teachers indicating they have a high level of need for professional development in the following areas:

- Teaching students with special needs
- ICT skills for teaching
- New technologies in the workplace
- Student behaviour and classroom management
- Teaching in a multicultural or multilingual setting
- Approaches to individualised learning
- Student career guidance and counselling
- Student evaluation and assessment practice
- Teaching cross-curricular skills
- Developing competencies for future work
- Pedagogical competencies
- School management and administration
- Knowledge of the subject field(s)
- Knowledge of the curriculum
Regardless of the content, over 3/4 of teachers report that...

...the professional development in which they have participated has had a positive impact on their teaching.
Teachers feedback: 
*direct classroom observations*

Percentage of teachers

- Principals
- School Management
- Other teachers

Countries: Bulgaria, Poland, United States, Romania, Croatia, Alberta (Canada), Czech Republic, Abu Dhabi (UAE), Flanders (Belgium), Serbia, Slovak Republic, Japan, Israel, Average, Singapore, Latvia, Brazil, Mexico, Malaysia, Sweden, Estonia, England (UK), Norway, Finland, Portugal, Denmark, Korea, Chile, Italy, Netherlands, France, Spain, Iceland, Australia.
Feedback and change in behavior

Percentage of lower secondary teachers who report a "moderate" or "large" positive change in the following issues after they received feedback on their work.

- Confidence as a teacher
- Motivation
- Job satisfaction
- Knowledge and understanding of main subject field(s)
- Teaching practices
- Student assessments to improve student learning
- Classroom management practices
- Methods for teaching students with special needs
- Public recognition
- Job responsibilities
- Role in school development initiatives
- Amount of professional development
- Likelihood of career advancement
- Salary and/or financial bonus

Chart showing the average and Italy data for each issue.
Consequences of feedback

Percentage of lower secondary teachers who "agree" or "strongly agree" that:

- A development or training plan is established to improve their work as a teacher
- A mentor is appointed to help teachers improve his/her teaching
- Teacher appraisal and feedback have little impact upon the way teachers teach in the classroom
- The best performing teachers in this school receive the greatest recognition
- If a teacher is consistently underperforming, he/she would be dismissed
Teachers and feedback

On average across TALIS countries,

Just above half of the teachers report receiving *feedback* on their teaching from *one or two sources*.

...and only one in 5 receive *feedback* from *three sources*.
Math teaching ≠ math teaching

PISA = reason mathematically and understand, formulate, employ and interpret mathematical concepts, facts and procedures
Focus on ‘word problems’

Formal math situated in a word problem, where it is *obvious* to students what mathematical knowledge and skills are needed.
Focus on ‘conceptual understanding’
Incentives, accountability, knowledge management

- Aligned incentive structures
  
  For students
  - How gateways affect the strength, direction, clarity and nature of the incentives operating on students at each stage of their education
  - Degree to which students have incentives to take tough courses and study hard
  - Opportunity costs for staying in school and performing well
  
  For teachers
  - Make innovations in pedagogy and/or organisation
  - Improve their own performance and the performance of their colleagues
  - Pursue professional development opportunities that lead to stronger pedagogical practices

- A balance between vertical and lateral accountability
- Effective instruments to manage and share knowledge and spread innovation – communication within the system and with stakeholders around it
- A capable centre with authority and legitimacy to act
The question is not how many charter schools you have but how you enable every teacher to assume charter-like autonomy.
Countries that grant schools **autonomy** over curricula and assessments tend to perform better in mathematics.

**Source:** PISA 2012
Schools with more autonomy perform better than schools with less autonomy in systems with standardised math policies.

School autonomy for curriculum and assessment $\times$ system's extent of implementing a standardised math policy (e.g. curriculum and instructional materials)

<table>
<thead>
<tr>
<th>Score points</th>
<th>Less school autonomy</th>
<th>More school autonomy</th>
<th>Standardised math policy</th>
<th>No standardised math policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>485</td>
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<td>480</td>
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</table>
Schools with more autonomy perform better than schools with less autonomy in systems with more collaboration.

School autonomy for resource allocation $\times$ System's level of teachers participating in school management
Across all participating countries and economies
Quality assurance and school improvement

Percentage of students in schools whose principal reported that their schools have the following for quality assurance and improvement:

- Implementation of a standardised policy for mathematics
- Regular consultation with one or more experts over a period of at least six months with the aim of improving
- Teacher mentoring
- Written feedback from students (e.g. regarding lessons, teachers or resources)
- External evaluation
- Internal evaluation/self-evaluation
- Systematic recording of data, including teacher and student attendance and graduation rates, test results and
- Written specification of student-performance standards
- Written specification of the school's curriculum and educational goals

![Bar chart showing percentages of students in schools with quality assurance measures in Italy, Singapore, and OECD average.](Fig IV.4.14)
Lessons from high performers

- Investing resources where they can make most of a difference
  - Alignment of resources with key challenges (e.g. attracting the most talented teachers to the most challenging classrooms)
  - Effective spending choices that prioritise high quality teachers over smaller classes
What teachers do beyond teaching

Average number of 60-minute hours teachers report spending on the following tasks in an average week:

- School management
- Communication with parents
- All other tasks
- Extracurricular activities
- Student counselling
- Team work
- Administrative work
- Marking
- Planning

Countries compared:
- Finland
- Malaysia
- Flanders (Belgium)
- Abu Dhabi (United Arab Emirates)
- Italy
- Israel
- Sweden
- Japan
- Korea
- Croatia
- Portugal
- Singapore
- Finland
- Korea
- Malaysia
- Japan

Number of hours range from 0 to 10.
Align the resources with the challenges

Countries with better performance in mathematics tend to allocate educational resources more equitably.

Source: PISA 2012
Square school choice with equity

- Controlled choice
  - Use student and school assessments
  - Foster collaboration among teachers and schools
  - Inform parents

- Financial incentives
  - Assistance for disadvantaged parents
  - Financial incentives for schools
A learning system

- An outward orientation to keep the system learning, technology, international benchmarks as the ‘eyes’ and ‘ears’ of the system
- Recognising challenges and potential future threats to current success, learning from them, designing responses and implementing these
Lessons from high performers

- **Coherence of policies and practices**
  - Alignment of policies across all aspects of the system
  - Coherence of policies over sustained periods of time
  - Consistency of implementation
  - Fidelity of implementation (without excessive control)

- **Money pits**
  - Commitment to universal achievement
  - Capacity at point of delivery
  - Must haves

- **High impact on outcomes**
  - Quick wins
  - Resources
  - Gateways, instructional systems
  - Incentive structures and accountability

- **Low impact on outcomes**
  - Low hanging fruits
  - Money pits
Lessons from high performers

High impact on outcomes

- Must haves
  - Commitment to universal achievement
  - Capacity at point of delivery
  - Coherence

Low impact on outcomes

- Quick wins
  - Resources where they yield most
  - Gateways, instructional systems
  - A learning system

- Incentive structures and accountability
  - High feasibility
  - Low hanging fruits

- Money pits
  - Low feasibility
<table>
<thead>
<tr>
<th>Average school systems</th>
<th>High performers in PISA</th>
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<tbody>
<tr>
<td><strong>Some</strong> students learn at high levels</td>
<td><strong>All</strong> students learn at high levels</td>
</tr>
<tr>
<td>Uniformity</td>
<td>Embracing diversity</td>
</tr>
<tr>
<td>Curriculum-centred</td>
<td>Learner-centred</td>
</tr>
<tr>
<td>Learning a place</td>
<td>Learning an activity</td>
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<tr>
<td>Prescription</td>
<td>Informed profession</td>
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</table>
Lessons from high performers

What it all means

<table>
<thead>
<tr>
<th>The old bureaucratic system</th>
<th>Student inclusion</th>
<th>The modern enabling system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some students learn at high levels</td>
<td></td>
<td>All students need to learn at high levels</td>
</tr>
<tr>
<td>Routine cognitive skills, rote learning</td>
<td></td>
<td>Learning to learn, complex ways of thinking, ways of working</td>
</tr>
<tr>
<td>Few years more than secondary</td>
<td></td>
<td>High-level professional knowledge workers</td>
</tr>
<tr>
<td>‘Tayloristic’, hierarchical</td>
<td></td>
<td>Flat, collegial</td>
</tr>
<tr>
<td>Primarily to authorities</td>
<td></td>
<td>Primarily to peers and stakeholders</td>
</tr>
</tbody>
</table>

Curriculum, instruction and assessment

Teacher quality

Work organisation

Accountability
Lessons from high performers

Thank you

Find out more about our work at www.oecd.org
– All publications
– The complete micro-level database

Email: Andreas.Schleicher@OECD.org
Twitter: SchleicherEDU

and remember:
Without data, you are just another person with an opinion