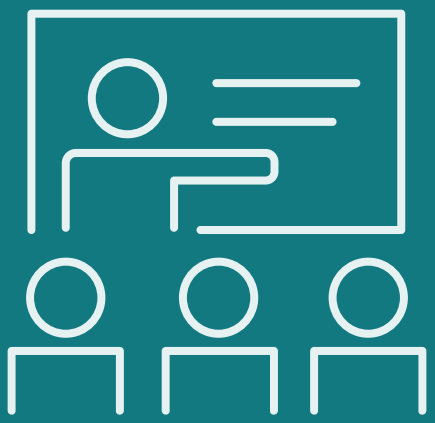
MARCH 2021

Lebanese Republic
Ministry of Education and Higher Education

the Education Commission

# Innovations in teacher deployment and distribution

How policymakers can use the latest technology and international evidence to support equitable learning outcomes and improve system efficiency



FAB INC.

EdTech Hub

IDB Inter-American Development Bank

## Equitable teacher deployment and distribution: an international challenge

**Getting enough teachers in the right places, with the right skillsets, is a challenge that affects education policymakers internationally (Ref 1)**. The resulting teacher shortages – often in high demand subjects, in geographically marginalized areas, or in demographics representative of the students they serve – are a major barrier to equitable learning outcomes for students.

**International evidence shows that breakthrough approaches in teacher deployment and distribution are possible, and can have a tangible impact on students' access to effective teachers.** The Education Commission's Education Workforce Initiative (EWI) has been working with partners internationally to draw together this evidence, as well as insights from the latest innovations and new technologies in this field. It aims to catalyze new thinking and to support policymakers to make progress at country level by piloting and scaling breakthrough approaches.

Photo Credit: UK Department for International Development

## Translating international evidence into practical guidance for national policymakers

EWI is delighted to be working in partnership with the Ministry of Education and Higher Education (MEHE) in Lebanon to discuss these insights. In March 2021 EWI and MEHE hosted a **policy dialogue** to discuss how the latest international evidence could inspire new approaches and help policymakers address Lebanon's current challenges in teacher distribution and deployment. The event drew together policymakers, researchers, high-level education officials, and international experts in a rich knowledge exchange, as well as practical discussions about how evidence might be applied in the Lebanese context.

**To benefit international policymakers, this document shares key insights and evidence from the dialogue including:**

- Five breakthrough approaches to tackling common challenges, based on case studies of new technologies and innovation shared by international experts at the policy dialogue event in Lebanon;
- A set of summary guidelines for policymakers to address teacher distribution and deployment issues, drawn from the case studies and international evidence;
- Insights from Lebanese policymakers on how evidence can be applied in their setting.

## What common challenges do policymakers face in teacher distribution and deployment?

**Teacher shortages are complex**. Many interrelated factors drive shortages – for example, a limited pool of qualified recruits, low status of teachers, low pay, poor working conditions, and unattractive career structures. Trained teachers sometimes choose not to enter the profession at all, and attrition rates of qualified professionals can be high in the early years due to lack of support.

Even if there is an oversupply of teachers at national level, having the right number of teachers doesn't mean you have the right type or that they are in the right places. Policymakers often experience shortages in terms of:

- Numbers of qualified teachers or of those with minimum training
- Geographical locations or school types (rural vs. urban, socio-economically disadvantaged schools)
- High-demand subject areas (math, science, and language)
- Representation, including gender, ethnicity, indigeneity, and linguistic group
- Teachers trained to teach remotely in light of COVID-19

Some of the typical underlying causes of inequitable teacher distribution and deployment are described below. The rest of this document offers ways to tackle these.

## Common causes of inequitable teacher distribution and deployment

1. **Shortage in teacher supply** – by teacher skillset (many countries struggle to recruit enough math and science teachers) or socio-demographic characteristics to ensure the workforce represents the student it serves.

2. **Poor capacity for data-driven decision-making** – many systems have data but struggle to link relevant data sets or build data literacy capacity to support data-driven decisions.

3. **Less desirable school settings reducing supply to some areas** – more qualified teachers often disproportionately work with more advantaged schools and privileged students, have smaller class sizes, and focus on later grades. This exacerbates inequities in lower grades and more remote or disadvantaged schools; vacancies are often filled by temporary or contract teachers.

4. **Sub-optimal allocation processes** – teacher assignment processes can be inefficient and lead to inequalities, with poor optimization of teacher skills or teaching capacity.

5. **Political economy and incentive issues** – assignment processes can often be informal with local level discretion; good systems may be distorted by local political pressures. (Ref 2)

# What can we learn from international evidence?

EWI has been working with international partners including IDB, Fab Inc., and EdTech Hub to draw together the latest evidence and innovations in teacher deployment and distribution. Our research in this areas suggests five promising approaches which are helping policymakers ensure effective teachers reach underserved areas:

## Align supply and demand, including alternative pathways into teaching

**Strong partnerships among training institutions, schools, and districts** are important to align supply and demand of teachers. Some countries have recruited teachers directly from underserved areas. Another strategy is providing alternative pathways to qualification for trainee or unqualified teachers, training them in schools supported by distance learning. *In Nigeria, the Teacher Development Programme is institutionalizing relationships in each state between the colleges of education and the State University Basic Education Board (SUBEB) to ensure that colleges are training teachers to meet the subject, level, and skills needs and to help match supply and demand.*

## Consider incentives to attract and retain qualified teachers in hard-to-staff areas

**Financial and non-financial incentives to attract and retain qualified teachers in underserved areas,** especially those typically in short supply like science teachers, can be effective in the short term. Strategies to encourage teachers to accept positions in underserved areas include career guarantees for accompanying spouses, housing and transportation, and provision of local in-situ training. It can also help to provide incentives that apply after teaching in a difficult area, such as the chance to choose the next school and greater promotion opportunities. *The Philippines, with support from UNICEF's Data Must Speak Initiative, developed a hardship index in collaboration with teachers to encourage deployment and retention of experienced teachers in disadvantaged schools. The index determines levels of special allowances for teachers by combining factors such as travel times, internet access, and municipality poverty levels.*

## Improve allocation and deployment models

**Better models can help optimize allocations and deploy teachers to underserved areas.** There is some evidence that identifying which school characteristics teachers value the most can provide greater understanding for how to successfully deploy teachers to hard-to-staff areas. This can be done through preference matching models which consider teacher preferences and characteristics in conjunction with school-level data. In countries where teachers are allocated on a per-capita basis (i.e. the number of teachers is determined by the number of students, and the number of subjects is then determined based on the available teachers) as opposed to a per subject basis, teacher utilization is more efficient. *Ecuador centralized the recruitment of new teachers through selection based on a centralized exam and allocation based on teacher exam scores and teacher school preferences. Recent adjustments to the program's algorithms, including increased number of school preferences and teacher exam scores weighted higher than preferences, resulted in a reduced number of vacant positions, improved teacher welfare, and enhanced quality of educators.*

## Strengthen data systems and capacity for more equitable allocation

**Creating education workforce specific systems can underpin improved teacher allocation models,** such as Teacher Management Information Systems (as part of EMIS) or Teacher Training and Development Information Systems linked to school and pupil data to enable better needs-based deployment. These systems can help policymakers better understand the quality and availability of teachers in the most marginalized communities. They can also help to identify teacher development needs. Strategic use of geographic information systems (GIS) data and technology can also support (see Innovation Area 1). *In Zimbabwe, policymakers have created teacher management systems as part of their EMIS system to capture more specific education workforce data. This is then linked to school and pupil data so that allocation can be driven by need and CPD can be targeted.*

## Harness subject specialists, coaches, and peer learning

**Where there is potential oversupply of teachers, these teachers could be used to provide coaching.** This is emerging as a promising practice for professional development, when it is data-driven and structured to include reflections on practice, strategies for improvement, clarity around the why and the what of teaching, new practice trials, and progress reviews. Experienced or specialist teachers could be used to facilitate professional learning communities and communities of practice that have shown improved teaching and learning outcomes and motivation, and peer collaboration has been shown to have strong impacts on learning outcomes. Specialist teachers could broadcast lessons through video or radio to areas requiring subject expertise where there are no appropriately qualified teachers. *The Media Center initiative in Amazonas state in Brazil uses video conferencing to broadcast lessons delivered by subject experts to over 1,000 rural schools. Lower to upper secondary school progression rates increased, dropout rates nearly halved, and children's learning steadily improved.*

# Guidelines for policymakers

This section offers summary considerations for policymakers who want to tackle inequities in teacher distribution and deployment, drawn from the international evidence and the case studies presented at the policy dialogue event in Lebanon.

## Align supply and demand, including alternative pathways into teaching

- What forums exist for different actors on the supply and demand sides to share their needs and plans and to discuss ways of better aligning them?
- What local knowledge do teacher training colleges have about latent local talent pools for teachers – which demographics could be targeted to train as teachers?
- How might graduates in shortage subject areas, such as science and math, be targeted and encouraged to train as teachers?
- Can alternative pathways to teaching be developed by offering accredited training as a bridge to teaching, alongside support and career guidance?

## Consider incentives to attract and retain qualified teachers in hard-to-staff areas

- Which characteristics do teachers value the most in schools? What is considered a "hardship" location and can this be recognized and captured in recruitment?
- What non-financial incentives are possible, such as offering less teaching time, smaller class sizes, the ability to choose the next school, more CPD?
- Is there opportunity to consider financial incentives such as housing provision or faster progression up pay bands?
- Is there an opportunity to nudge teachers into choosing hard-to-reach schools by appealing to their moral purpose?
- How do short-term incentives fit into a longer-term strategy to ensure an adequate supply of qualified, skilled teachers?

## Improve allocation and deployment models

- How can teacher allocation models be made more transparent at the central level?
- Can central-level deployment be considered, to better match teachers with schools based on need?
- Can mandatory rotation of teachers be considered to ensure the allocation of skilled teachers to schools with diverse needs?
- How can teacher preferencing matching models be improved – including revisions to rules and algorithms – using international evidence and techniques to optimize allocation and teacher satisfaction with placements?
- Can new techniques be used – such as Geographical Information Systems (GIS) to inform more equitable deployment?

## Strengthen data systems and capacity for more equitable allocation

- How can you get better data on schools' needs and gaps?
- Is there data on teacher skills and workload, particularly in known shortage areas such as STEM?
- How can data be linked, such as timetable data, workforce data, school geolocation data, capitation grant data?
- Can new techniques be used – such as Geographical Information Systems (GIS) to model how specialist expertise could be shared across schools?
- How can the data system architecture be organized to meet the needs of the system and ensure integrated planning – e.g. teacher payroll data, teacher training data, school inspection data?

## Harness subject specialists, coaches, and peer learning

- Where are your most experienced teachers in the system and how could you leverage their expertise to have the most impact on learning, for example by sharing expertise across schools?
- Can the expertise of those exiting the workforce (including retiring teachers) be harnessed to benefit other teachers – e.g. through flexible contracts alongside pensions?
- Which structures exist to share expertise, such as professional learning communities, or school cluster meetings?
- What opportunities do new technologies offer for more experienced teachers to share their expertise remotely – e.g. remote coaching, modelling classes, sharing video lessons?

# **Tools and techniques** – Three case studies of international innovations in teacher deployment and distribution

## INNOVATION AREA 1: GIS

How GIS can be used to strengthen data and harness workforce expertise, to ensure more equitable allocation of teachers

### BENEFITS OF GIS TECHNOLOGY INCLUDE:

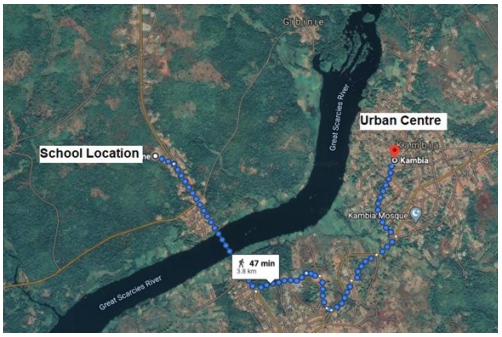
- More equitable and efficient distribution of teachers and subject specialists
- Improved planning of school support – for example pedagogical coaches, inspectors, or CPD clusters
- Can support longer-term planning including catchment area planning and associated workforce implications

**What is GIS?** GIS stands for Geographical Information System. It offers education policymakers mapping and visualization of education data to support planning and decision-making.

**How can it be used to support equitable teacher deployment and distribution?** Some education systems are starting to use GIS data and technology to inform teacher allocation and distribution. GIS can bring together data about students, schools, and the teaching workforce which can be used to:

1. Illustrate inequitable workforce allocation more accurately (to the level of specific schools rather than just rural areas), for example, visually displaying schools where there are specific shortages in STEM specialists and comparing this to schools nearby where there is oversupply.
2. Link data on resources, teachers, infrastructure, and school performance to support better allocation of teachers, e.g. increasing deployment to remote schools. The analysis can also be extended to support school infrastructure planning and catchment area planning and policies.
3. Identify more efficient, localized solutions, such as how to optimize inspection routes. Practical examples include adapting the routing and travel times to model for cars and traffic; IIEP-UNESCO are pioneering the use of GIS for inspection route planning.
4. Undertake longer-term projections on education system needs by combining data on where schools are, where students are, and where teachers are (including experience and specialisms). Data from pre-service teacher training institutions can be integrated with current shortage data to understand the future pipeline and help identify entry points for interventions.

**What is the impact?** Analysis by EWI and Fab Inc. using GIS in Sierra Leone showed that up to a third of schools lacking a subject specialist could jointly be served by specialists at nearby schools, creating a more efficient system.





**Left**: We can account for routes, not just distances

**Right**: Sharing under-utilized specialist teachers across nearby schools in need

# INNOVATION AREA 2: Improving rules-based teacher allocation models

Lessons from Peru and Ecuador on improvements to centralized teacher allocation models

**What does this innovation involve?** In Ecuador and Peru, the IDB worked with policymakers to improve centralized teacher selection processes. The innovations included clear rules for teacher hiring and deployment (including a matching algorithm that allocates teachers to schools), new technologies to improve teacher choices, and incentives to attract teachers to hard-to-staff schools.

**How can the approach be used to support equitable teacher deployment and distribution?** In Ecuador innovations at the "back-end" included:

1. A centralized teacher selection process (including cognitive and mock class tests)
2. A matching algorithm that focuses on teacher performance over teacher preferences

At the "front-end" there were innovations in the user experience for teachers, including:

3. The ability of teachers to select vacancies rather than districts
4. An increase in the number of vacancies that teachers can rank
5. Automated feedback for teachers on their applications

**What is the impact?** The new approach has improved system efficiency and equity: the percentage of unfilled vacancies has declined, with an increase in high-performing teachers in the system and in more disadvantaged schools.

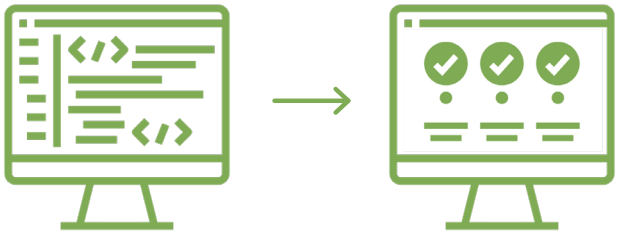
In a further innovation, the IDB tested two behavioral strategies in Peru designed to nudge teachers to apply to job vacancies in disadvantaged schools. One strategy targeted teachers' altruistic identity by making the disadvantaged schools more salient during the advertising and application process – for example through pop-ups on the job board, and one targeted extrinsic incentives, which simplified the information and increased the salience of an existing government monetary-incentive scheme to reward teachers who work in underprivileged institutions. Both strategies were shown to be successful in triggering teacher candidates to apply to vacancies in disadvantaged schools and the altruistic approaches worked well for attracting higher performing teachers (Ref 3).

## BENEFITS INCLUDE:

- Improved front end experience for teachers in terms of choice and transparency
- Improved deployment of skilled teachers to more disadvantaged schools
- Reduction in unfilled vacancies
- Potential reduction in absenteeism and attrition by incorporating teacher preferences in the matching element
- Reduced complaints and arbitration due to greater transparency

**BACK-END**

- Selection process
- Number of schools
- Matching algorithm
- Number of rounds



**FRONT-END**

- Client-facing outreach
- Interface to view choices and apply for vacancies

# INNOVATION AREA 3: Incentives

Lessons from the use of incentives in South Korea and elsewhere

## BENEFITS INCLUDE:

- More equitable distribution of teachers
- A relatively low-cost intervention
- Teachers benefit from improved promotion opportunities

**What do we mean by incentives?**

Incentives to attract and retain qualified teachers in underserved areas, especially those typically in short supply like female or science teachers, can be effective in the short term to improve education for poor and marginalized children. Incentives can be **monetary** (such as stipends or allowances for housing and transport) for serving in hard-to-reach schools, or **non-monetary,** such as career guarantees for accompanying spouses or the provision of local in-situ training. (Ref 4)

**What approaches are used in South Korea?**

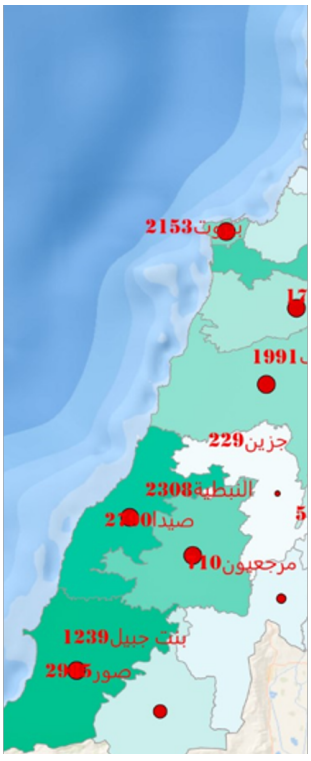
In South Korea disadvantaged groups have better access to more qualified and experienced teachers. This is the result of strong teacher management policies across the career lifecycle, from recruitment to teacher professional development. Teacher hiring decisions are made at province or city level, with the highest priority given to disadvantaged areas. The practice of rotating teachers every five years to a different school within the city or province demonstrates commitment to distributing good teachers equitably. Teachers working in disadvantaged schools benefit from incentives such as an additional stipend, smaller class sizes, less teaching time, and the chance to choose their next school after teaching in a difficult area (Ref 5). Teachers working in disadvantaged schools also benefit from promotion incentives as a result of a points-based appointment system leading to the highly coveted position of vice principal and then principal. The system relies on a tally of points which include factors such as working in remote and underserved areas, as well as factors based on one's career, work performance, education, and research performance (Ref 6).

**What is the impact?** More equitable distribution of teachers and improved promotion opportunities. Among the top five countries in student achievement based on the 2003 TIMMS international assessment, South Korea was the only country where low-SES students were more likely than high-SES students to be taught by qualified teachers (Ref 7).

## Current situation and crises

Lebanon is suffering the worst economic crisis in decades. Since October 2019, the Lebanese economy has plunged into compounding crises, specifically economic, financial, and political, as well as the Syrian crisis, followed by COVID-19. The massive explosion in the Port of Beirut damaged residential and commercial areas including several public schools. These crises have weighed heavily on Lebanon's public education in three main ways:

- The migration from private to public education. The 2019-20 school year has shown about 10,000 more children enrolled in public schools. Those numbers are expected to increase this year.
- The education workforce has been deeply affected by the economic crisis.
- The country's socio-economic resilience has been profoundly impacted. According to the World Bank, poverty in Lebanon is likely to continue to worsen, surpassing half of the population by 2021. This will increase the numbers of students who need more support to be able to learn and stay in school. ("Lebanon economic monitor: The deliberate depression" published on 1/12/2020)




## Access for all students

In recent years, plans in the education sector in Lebanon have focused on the public sector and the increasing number of non-Lebanese students who need to be accommodated. Over the last six years the public education system has increased its student capacity by approximately 77% and will continue to need to accommodate 600,000 Syrian children in the immediate future.

## Teachers

The public system has approximately 37,285 staff: 20,144 civil servant and 17,141 contractual (2019-2020, MEHE). Contract teachers can be paid by MEHE, municipalities, or donors. Contracted teachers do not always have specialized degrees, 54% of existing teachers do not hold a postgraduate degree, and only 4% have a specialized degree. Teacher quality is boosted by training and coaching to observe and review classroom activity and offer strengthening techniques and approaches. Recent training and coaching support have looked at social and emotional skills, health and safety, child development, as well as the basics of reading and writing.

## Key challenges in Lebanon identified during the policy dialogue include:

### HUMAN RESOURCES

- Lack of clarity on employment needs
- Lack of transparency in deploying teachers
- Lack of qualified full-time teachers
- Poor compensation or legal protections for contract teachers
- Need for continuous assessment and training
- Need to optimize staff reallocation to address the challenges of recruiting teachers in the public sector when civil servants are retiring every year
- Need to enhance motivation and engagement of the education workforce

### INFRASTRUCTURE

- Poor geographical distribution of schools
- Lack of equipment for school and online teaching
- Limited use of the GIS system
- Data about students, teachers, and school buildings change over time

### FINANCIAL

- Financial challenges for contracting and employment
- Budget decrease and hardship of employment

### POLITICAL/LEGAL

- Political and sectarian interference in teachers' recruitment and deployment and in distribution of schools
- A new law prohibits recruitment in the public sector (as a civil servant)

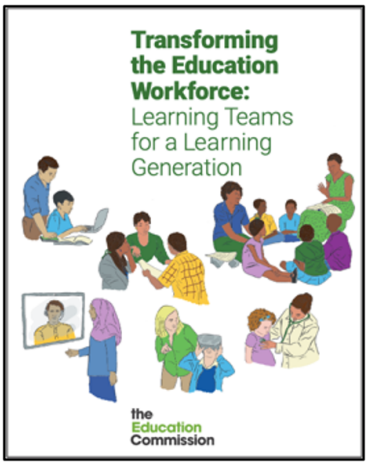
### TECHNICAL

- Curriculum needs updating
- Student/teacher ratio does not match the international standard.

## Summary of next steps identified for Lebanon:

1. Build up teacher datasets on SIMS to include contractual as well as tenured teachers
2. Set official criteria, standardize, simplify, and make transparent teacher recruitment, deployment, and transfer procedures, ideally via central online portal. Ensure more equitable teacher distribution.
3. Ensure that pre-service and in-service training are aligned, compulsory, and prioritize national areas of teacher weakness
4. Ensure simple pass/fail online skills tests before deploying contractual teachers
5. Make data on teachers more openly available and encourage researchers and academics to explore datasets and pilot new approaches on a small scale
6. Strengthen online coaching and align training and coaching
7. Strengthen coordination-linking software and data analysis

# More information and resources





**Useful sources of GIS data sets:**

- For estimates of where the population is and where children are located, WorldPop has GIS population data down to 100-metre-squared accuracy and by different age groups: https://www.worldpop.org/
- Humanitarian Data Exchange for a range of datasets and GIS datasets: https://data.humdata.org/


1. UIS. 2016. “The World Needs Almost 69 Million New Teachers to Reach the 2030 Education Goals.” UIS Fact Sheet 39. Montreal: UNESCO Institute for Statistics (UIS); Education Commission. 2016. The Learning Generation: Investing in Education for a Changing World, 70. New York, New York: International Commission on Financing Global Education Opportunity; Ingvarson, Lawrence, John Schwille, Maria Teresa Tatto, Glenn Rowley, Ray Peck, and Sharon L. Senk. 2013. “An Analysis of Teacher Education Context, Structure and Quality-Assurance Arrangements in TEDS-M Countries: Findings from the IEA Teacher Education and Development Study in Mathematics and Science.” Amsterdam: International Association for the Evaluation of Educational Achievement (IEA); OECD. 2018. “In which countries do the most highly qualified and experienced teachers teach in the most difficult schools?” PISA in Focus 85. Paris: OECD; Mulkeen, Aiden, William Ratteree and Ilse Voss-Lengnik. 2017. "Teachers and teacher policy in primary and secondary education." Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); Mulkeen, Aiden and Nuala Crowe-Taft. 2010. “Teacher attrition in Sub-Saharan Africa: The neglected dimension of the teacher supply challenge.” Paris: International Task Force on Teachers for EFA.
2. Mulkeen, A., Ratteree, W., & Voss-Lengnik, I. 2017. "Teachers and teacher policy in primary and secondary education." Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
3. Ajzenman, Nicolás; Bertoni, Eleonora; Elacqua, Gregory; Marotta, Luana; and Méndez, Carolina. 2020. “Altruism or Money?: Reducing Teacher Sorting Using Behavioral Strategies in Peru.” Washington, DC: IADB
4. The Education Commission. 2019. Transforming the Education Workforce: Learning Teams for a Learning Generation. New York: Education Commission.
5. Luschei, T.F., Chudgar, A., & Rew, J.W. 2013. “Exploring differences in the distribution of teacher qualifications across Mexico and South Korea: Evidence from the Teaching and Learning International Survey.” Teachers College Record, 115(5); Kang, N., and M. Hong. 2008. “Achieving excellence in teacher workforce and equity in learning opportunities in South Korea”, Educational Researcher, No. 37.
6. Lee, S. and Koh, A. 2020. "Lessons for Latin America from Comparative Education: South Korea’s Teacher Policy." Department of Research and Chief Economist IDB. Discussion Paper DP-744 April 2020.
7. Akiba, Motoko, Gerald K. LeTendre, and Jay P. Scribner. 2007. "Teacher Quality, Opportunity Gap, and National Achievement in 46 Countries." Educational Researcher, Vol. 36, No. 7, pp. 369–387. DOI: 10.3102/0013189X07308739