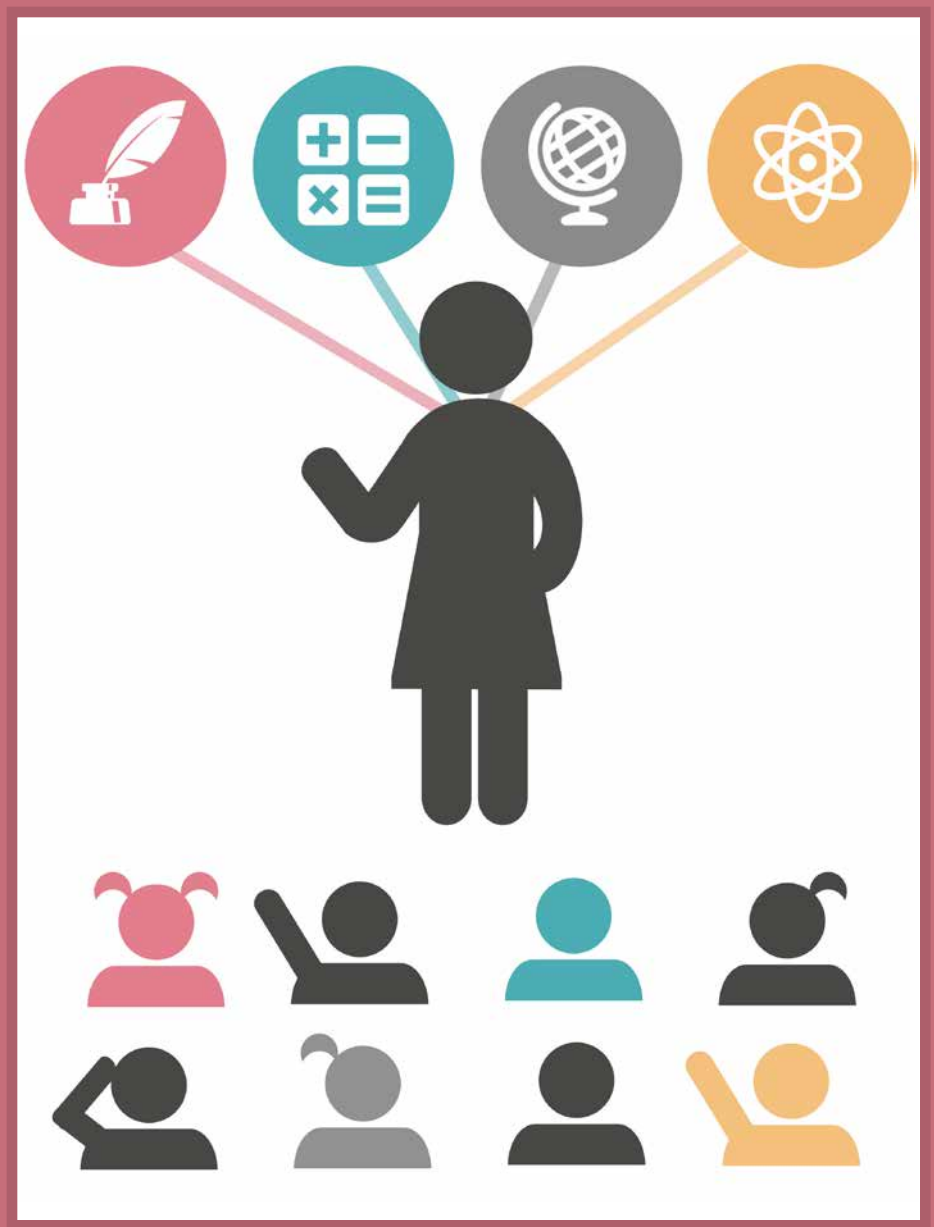
Not So Elementary

Primary School Teacher Quality in Top-Performing Systems

POLICY BRIEF



Teacher Quality Systems in Top-Performing Countries

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This policy brief is a summary of the findings and analysis contained in *Not So Elementary: Primary School Teacher Quality in Top-Performing Systems* by Ben Jensen, Katie Roberts-Hull, Jacqueline Magee & Leah Ginnivan. The analysis presented in the report was conducted by Learning First. Learning First is an Australian organization committed to education reform. Learning First uses research, consulting and development to help improve education systems in Australia and around the world. The full report can be found at **www.ncee.org/cieb**.

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Not So Elementary:

Primary School Teacher Quality in Top-Performing Systems

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July 2016

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Results from national and international assessments continue to show the same disturbing pattern: While U.S. students have made gains on national assessments since 1990, there has been little improvement in the last decade, and U.S. students are still behind many other advanced nations.[1] On the Programme for International Student Assessment (PISA) in 2012, U.S. 15-year-olds were ranked 27th in math, 17th in reading, and 20th in science, and there has been no significant change in these performances over time.[2]

The countries that outperform the United States did not always excel in academic achievement. These countries worked hard to improve their systems of education, and have now in place systems that produce much higher and equitable student performance, at a lower cost than the United States pays for schooling.

One of the key elements of the strategies for improvement in high-performing countries is strong preparation for primary teachers. These countries recognize that providing young students with a strong background in literacy, numeracy, and science will prepare them well for the more challenging content they face in middle and high school and beyond. Building on research on teacher preparation, the high-performing countries focus on developing primary teachers' *subject-matter expertise*.

Many might assume that the subject-matter expertise for elementary school teaching is not too difficult for teachers; after all, teachers themselves graduated from school and then college, and they should be prepared to teach any content that nine-year-olds are learning.

However, the subject-matter expertise required for teaching is specialized—and significantly different than what one would learn in general secondary and tertiary education. This is why just getting "smarter" candidates to go into teaching will not necessarily improve instruction. Teachers need a deep understanding of both the content taught in elementary schools *and* of how to help students learn this content—what's often called pedagogical content knowledge. This subject expertise is a strong determinant of teacher effectiveness and student learning, a logical finding that has been supported by many studies across a range of subject areas.[3]

This brief will describe ways that four high-performing systems—Finland, Hong Kong, Japan, and Shanghai—use four main policy levers—selection, specialization, initial teacher education, and ongoing professional learning—to develop the subject-matter expertise of elementary teachers. It will conclude with suggestions on how the United States can adopt some of these solutions and strengthen its elementary teaching force.

The Need for Subject-Matter Expertise

Elementary school teachers should have, at the minimum, a deep, flexible, and accurate knowledge of the content they will be teaching to students. Without strong conceptual understanding of the content, teachers are not well equipped to help students. This general idea has been supported by a range of reports and studies since the 1980s.[4] It may seem obvious, but research shows that effective teachers generally know more about the subjects they are teaching.[5]

Evidence suggests that the most critical content knowledge for elementary school teachers is a "profound understanding" of the concepts taught in elementary school. A profound understanding means that teachers understand *the content they are teaching* in-depth, accurately, and without confusion.[6] This means that someone who is teaching elementary school science should understand the basic concepts taught in lower grades to a high level of accuracy. There is little evidence, however, that the knowledge gained at advanced levels is as directly useful to student learning in elementary school.[7]

Why is having deep content knowledge in the subject you are teaching so important in the early grades? That is usually because that student misunderstands the mathematical concepts, for example, that make the procedures work. To help that student, the teacher needs to have a firm grasp

of the concepts that underlie the math, because it is the way the concepts work that explains why the math works. If the teacher does not understand the concepts that underlie arithmetic, proportion and so on, it is almost impossible for that teacher to understand why that student's understanding of the concepts is faulty.

Most of us view arithmetic and the other topics in elementary school mathematics as "elementary," but they are not. It took more than a millennium for human beings to develop them. So it is hardly surprising that many teachers do not grasp them. It is certainly true that pedagogical content knowledge (PCK), that is, knowledge about the most effective ways to teach specific topics in a subject—arithmetic, for example—is crucially important, one cannot learn what is most important about pedagogical content knowledge in mathematics without first mastering the underlying concepts that one is trying to teach. Like content knowledge, greater teacher PCK is correlated with greater student learning.[8]

PCK differs from content knowledge in that it involves an understanding of how students learn, how to translate a conceptual understanding into compelling examples for students, identifying and correcting student misconceptions, and being able to explain how new concepts relate to previous learning.

For reading instruction, for example, PCK implies that teachers should deeply understand the process of learning to read and have an array of strategies to help young readers. In math, PCK includes an understanding of how math knowledge develops in students and being able to anticipate student thinking as students approach math problems. Science teachers need to understand which instructional approaches are best for the different types of content being taught.

There is some evidence that the content knowledge and pedagogical content knowledge of U.S. teachers is weak. For example, Deborah Loewenberg Ball (1990) found that only 11 percent of 252 preservice teachers interviewed "were able to describe a completely appropriate representation of 1¾ ÷ ½."[8] This means that 89 percent of preservice teachers interviewed, including some with mathematics degrees, were unable to accurately describe how they would teach division of fractions, a vital math concept throughout elementary and secondary education. Similarly, one study reviewed by the National Reading Panel in 2000 found that 42 percent of prospective teachers could not correctly define the term phonological awareness, a key concept in the teaching of reading.[9]

Policies to Develop Subject Expertise

High-performing countries have focused on ensuring that elementary teachers are well-prepared to teach, and have placed a strong emphasis on developing their subject-matter expertise. They have done so by employing policy levers that ensure that knowledgeable teachers enter teaching, that schools create roles to draw on teachers' subject-matter expertise, that initial teacher education stresses both content knowledge and pedagogical content knowledge, and that teachers have ample opportunities for professional learning to enhance their subject-matter expertise throughout their careers.

Selection

High-performing countries have set rigorous standards for becoming teachers, in order to ensure that only the most well-qualified individuals enter classrooms. Each high-performing system has selection assessments at different points in the teacher development pathway—some are focused on assessing early on (e.g., entry to teacher education), and others are later in the pathway (e.g., at hiring).

Finland is well known for having a rigorous admissions process at entry to initial teacher education. Gaining admission to teacher education programs is very competitive—only 10% of applicants are successful. Teacher candidates go through a rigorous, multistage admissions process when applying to teacher education programs. All candidates first take the VAKAVA examination, which involves a series of multiple-choice questions based on academic material published

approximately six weeks before the exam. The material and examination is highly challenging, with points deducted for incorrect answers or nonresponses. The next phase of admission may involve a sample lesson and an interview where candidates describe their reasons for wanting to become a teacher.

Japan, by contrast, has an open teacher education system, with hundreds of providers. Many in Japan complain that it is too easy to gain teaching credentials, and there are many more certified teachers than there are teacher job openings.

So instead of focusing the strongest selection assessments on entry to teacher education programs, Japan created an employment exam. Japan has a very rigorous teacher selection process, but unlike Finland, this assessment is at the point of hiring. All teacher candidates applying for teaching jobs must take an employment exam that tests teacher knowledge and ranks candidates, allowing schools to hire only from the top of the rank.

Specialization

Specialization refers to the idea that elementary school teachers have some sort of subject-specialization in their preparation and development. It can also mean a narrower teaching role—instead of teaching all subjects, elementary teachers may teach only one or a few.

Some high-performing systems have specialization in elementary teachers' jobs, while others, such as Finland and Japan, do not. In those countries, teachers in their initial preparation study all subjects taught in primary school; however, they also choose a subject to major or minor in, so they receive particularly specialized content knowledge about at least one subject area. In Japan, teachers with specialized knowledge lead professional learning in that subject area.

Hong Kong and Shanghai (along with Singapore), by contrast, have various degrees of specialization, so their elementary teachers only have to teach one or a few subjects. This enables teachers to have a smaller preparation workload, since they only have to prepare for a single subject, and offers opportunities for collaboration, since teachers can work together to support students they all teach.

Initial Teacher Education

The initial teacher education programs in high-performing systems share three things in common:

- Focus on foundational knowledge that teachers need at the elementary school level
- Emphasis on pedagogical content knowledge and not just general pedagogical skills
- High degree of alignment to school curriculum

The ITE programs recognize the value of subject expertise, but this doesn't mean that their elementary school teachers all have master's degrees or PhDs in their subjects. The systems understand that elementary teachers are better off developing a deep and flexible understanding of foundational content taught in elementary school level rather than advanced content.

An important element of the curriculum in these systems is the interaction between the ITE curriculum and the elementary school curriculum. In all four systems, school curriculum is set centrally (although there is some ability for districts and schools to adapt curriculum to the local environment). To varying degrees, ITE institutions have been able to follow suit, basing their curriculum for teacher education on the content knowledge and pedagogical content knowledge that elementary teachers will most need in the classroom. It is common for curriculum updates to occur on a regular basis (e.g., every 10 years in Japan) and for the central authorities to consult heavily with ITE providers during the revision process.

In Hong Kong and Shanghai, teachers often choose a subject-specific program or have a "major" in the subject they will teach in elementary school. The programs often have a relatively large focus on the content knowledge in the course load, because teachers are mainly taking courses in just one or two subjects. Pedagogical content knowledge is also an important component of these programs.

Finnish and Japanese elementary teachers teach all subjects, so they must therefore study all subjects during ITE. In general, this means programs have a few required courses in each subject that touch on the basics of content knowledge and pedagogical content knowledge but cannot go into too much depth because there is limited course time. The few required courses for each subject are usually focused directly on the foundational matter covered in elementary school teaching.

Pedagogical content knowledge is a big focus of generalist ITE courses in Finland and Japan, even though it is not always referred to as "pedagogical content knowledge." The courses teach a range of pedagogical strategies to effectively support student learning, including how to recognize and correct common student misunderstandings and how to differentiate their instruction to ensure learning across the broad range of abilities teachers are likely to encounter in their classrooms.

Professional Learning

ITE can provide a strong base of subject expertise for teachers before they enter schools. However, it is unlikely that ITE can fully prepare a teacher for all of the realities of a classroom environment. This is why in-school supports for teachers are critical: new teachers need to continue to develop subject expertise and fill in knowledge gaps as they adjust to full-time teaching.

Finland, Japan, Shanghai, and Hong Kong each have different ways of making sure teachers are supported, especially in their first few years of teaching. Japan and Shanghai in particular have strong cultures of professional learning in schools that focus on developing subject expertise through a culture of lesson observation and lesson study.

For example, much of Shanghai's professional learning system is structured to develop subject-specific expertise. Each teacher has access to a mentor, who is an expert in the same subject. Teachers also participate in research and lesson groups, which allow teachers to engage in research that develops pedagogical content knowledge. As teachers develop, they are recognized and rewarded for their increasing expertise and have a responsibility to mentor younger teachers in the same subject as they move up the career ladder.

In Hong Kong, new teachers observe classrooms in their specialized subject area and have their classrooms observed as well. They then take part in reflection activities to understand what they have learned from their peers.

A Systemic Approach

While analysts that have examined these high-performing systems have tended to focus on unique features—like the requirement for master's degrees in Finland or the specialists in primary schools in Hong Kong—the most salient feature about these systems is their *systemic* nature. In Hong Kong, Shanghai, Japan, and Finland, different parts of the system constantly reinforce the need for deep subject expertise.

Thus, not all high-performing systems have, for example, specialist elementary math teachers. But all of these systems have elementary teachers who went through ITE with specializations in math (and other subject areas). Then when they enter schools they receive professional development with strong subject focus, work from instructional materials and curriculum that focus on deep subject expertise, and are often recognized and promoted based on their level of subject expertise.

When system leaders continually emphasize the importance of subject expertise, it sends unambiguous messages to all parts of the education system. Teacher assessments of subject expertise signal its importance to effective teaching. School curriculum that requires students to develop a deep understanding of subject expertise sends a message about the teachers required to deliver the curriculum. And when system leaders deliver instructional materials that support instruction involving deep pedagogical content knowledge, it sends a clear signal to the profession and those who train and develop teachers.

Over time, these messages, if delivered consistently, have an impact. They change the expectations of

what is required to become an effective elementary teacher. Districts and regions offer more support to develop elementary teacher subject expertise, professional development providers change their focus to gain market share, and universities follow suit, especially when they are included in reforms to develop subject expertise across the system.

The result is high performance for all students. And it all starts in elementary school.

Endnotes

1. DeSilver, 2015
2. OECD, 2012
3. Aloisi, Higgins, & Major, 2014
4. National Research Council, 2010; Darling-Hammond & Bransford, 2005; Coe et al., 2014; Allen, 2003
5. Campbell et al., 2014; Harris & Sass, 2011; Metzler & Woessmann, 2012; National Research Council, 2010
6. Ma, 1999
7. Floden & Meniketti, 2005; Harris & Sass, 2011
8. Deborah Loewenburg Ball, 1990
9. Willingham, 2015

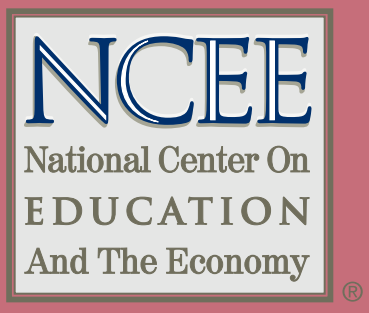
The Center on International Education Benchmarking's Study of Teacher Quality Systems in Top-Performing Countries is a multi-part series and includes the following titles which are available online at www.ncee.org/publications:

Developing Shanghai's Teachers

Beyond PD: Teacher Professional Learning in High-Performing Systems

Not So Elementary: Primary School Teacher Quality in Top-Performing Systems

And a forthcoming series of reports from Linda Darling-Hammond of the Stanford Center for Opportunity Policy in Education (SCOPE).



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