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A Comparative Study of Teacher Preparation and Qualifications in Six Nations

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A Comparative Study of Teacher Preparation and Qualifications in Six Nations

Abstract
Across the educational systems of the world, few issues have received more attention in recent years than the problem of ensuring that elementary- and secondary-school classrooms are all staffed with adequately qualified teachers (Mullis et al., 2000; OECD, 1994, 2005; Wang et al., 2003). Even in nations where students routinely score high on international exams, the issue of teacher quality is the subject of much concern. This is not surprising. Elementary and secondary schooling is mandatory in almost all nations and children are legally placed in the care of teachers for a significant portion of their lives. It is widely believed that the quality of teachers and teaching are among the most important factors shaping the learning and growth of students. Moreover, this impact goes beyond student academic achievement. Across the world, observers routinely tie the performance of teachers to numerous, larger societal goals and problems - economic competitiveness and productivity, juvenile delinquency, moral and civic culture, and so on.

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A Comparative Study of Teacher Preparation and Qualifications in Six Nations

By Richard M. Ingersoll

Introduction

Across the educational systems of the world, few issues have received more attention in recent years than the problem of ensuring that elementary- and secondary-school classrooms are all staffed with adequately qualified teachers (Mullis et al., 2000; OECD, 1994, 2005; Wang et al., 2003). Even in nations where students routinely score high on international exams, the issue of teacher quality is the subject of much concern. This is not surprising. Elementary and secondary schooling is mandatory in almost all nations and children are legally placed in the care of teachers for a significant portion of their lives. It is widely believed that the quality of teachers and teaching are among the most important factors shaping the learning and growth of students. Moreover, this impact goes beyond student academic achievement. Across the world, observers routinely tie the performance of teachers to numerous, larger societal goals and problems—economic competitiveness and productivity, juvenile delinquency, moral and civic culture, and so on. In addition, the largest single component of the cost of education in any country typically is teacher compensation. Along with a general consensus among many nations that the quality of teachers and teaching is a vital resource, there is accordingly much concern surrounding how equitably this resource is distributed within educational systems. Indeed, some nations suffer from an apparent paradox—that despite an overall overproduction and oversupply of new teachers, there nevertheless appear to be substantial numbers of students without access to qualified teachers. This brief summarizes the results from a collaborative, comparative study of the qualifications of elementary and secondary teachers undertaken by a group of scholars, policy makers and senior education officials from six nations and one region: United States, Korea, China, Hong Kong, Singapore, Thailand, and Japan. The findings are the subject of a new report, *A Comparative Study of Teacher Preparation and Qualifications in Six Nations* (Ingersoll et al., 2007).

The Debate Over Teacher Quality

Perhaps because of recognition of its importance, the issue of teacher quality is a source of much debate and disagreement in many nations. Nowhere is this debate more pronounced and more divisive than in the United States. In recent years, the quality of elementary and secondary teachers and teaching has been widely criticized in the United States, both by those inside and outside the educational sector. However, there is little consensus in regard to the sources and reasons behind the purportedly low quality of teaching in American schools and, hence, the best strategies to improve teacher quality.

One of the most prominent viewpoints in this debate holds that the problem of low-quality teaching can be traced to inadequate and insufficient pre-employment training and licensing or certification of prospective teachers.[1] In this view, the preparation of teachers in college or university teacher-education programs, and government certification standards, all too often lack adequate rigor,

[1] We use the terms teaching certificate and teaching license interchangeably.

breadth and depth, resulting in high levels of underqualified teachers and low student performance. Accordingly, the solution, from this viewpoint, lies in making the entry and training requirements for teaching more restrictive, deeper and more rigorous. Advocates of this view look to emulate the higher prestige professions, such as medicine, academia and law. To this group, the surest way to upgrade the quality of teaching is to upgrade the qualifications standards required of new teachers (e.g., National Commission on Teaching and America's Future, 1996, 1997).

On the other side of this debate are those who argue for deregulating entry into teaching. This viewpoint also holds that the quality of teacher education and certification is poor. But, rather than increasing requirements, this opposing view holds that entry into the teaching occupation already is plagued by unusually restrictive and unnecessarily rigid bureaucratic entry barriers (e.g., Finn et al., 1999; Hanushek & Rivkin, 2004). These critics argue that there is no solid empirical research documenting the value of such entry requirements and, such barriers discourage large numbers of high-quality candidates from getting into the occupation. By doing away with these regulatory impediments, this argument concludes, schools could finally recruit the kinds and numbers of candidates they deem best and this would solve the quality problems that plague teaching.

One of the more popular variants of this de-regulation perspective favors a training model analogous to that utilized for entrance to post-secondary academic careers. The pre-employment preparation of professors in the United States usually includes little formal training in pedagogical and instructional methods. Similarly, from this viewpoint, having an academic or subject-matter degree in a subject is sufficient to be a qualified school teacher in that subject. Content or subject knowledge—knowing *what* to teach—is considered of primary importance for a qualified teacher. Formal professional training in pedagogical and methodological knowledge and skills—knowing *how* to teach—is considered less necessary or even irrelevant, and can be learned on the job.

Proponents of variants of the deregulation perspective have pushed a range of initiatives, most of which involve a loosening of the traditional occupational entry gates. Among the most widespread of these reforms are alternative certification programs, whereby college graduates can postpone part or all of their formal education training, obtain an emergency teaching certificate, and begin teaching immediately. It is important to note that proponents of these deregulation reforms claim the same rationale as proponents of upgrading existing entry standards and programs—the enhanced recruitment of high-quality candidates into teaching.

The research reported in this brief was conducted by the Consortium for Policy Research in Education (CPRE) and funded by the Institute of Education Sciences, United States Department of Education, under Grant No. R308A960003. Opinions expressed in this Brief are those of the authors and do not necessarily reflect the views of the Institute of Education Sciences, the United States Department of Education, CPRE, or its institutional members.

Because this debate is often politicized in the United States, it can be difficult for neutral observers and policymakers to separate rhetoric from reality. One way to shed light is to place such debates and claims in context, and one useful context is cross-occupational. How does teaching, its entry requirements, and their value compare to those in other lines of work?

In the United States, teaching as an occupation has an unusually ambivalent character. Compared with other occupations and professions, teaching is relatively complex work, with relatively low pre-employment entry requirements, but nevertheless with a relatively high amount of empirical scrutiny, and also skepticism of the requirements that do exist.

Among those who study work, organizations and occupations in general, teaching has traditionally been classified as a relatively complex form of work, characterized by uncertainty, intangibility, and ambiguity, and requiring a high a degree of initiative, thought, judgment and skill to do well (e.g., Bidwell, 1965; Lortie, 1975; see also Cohen, Raudenbush, & Ball, 2003). For example, in a classic comparative study of a number of occupations, Kohn and Schooler (p. 68, 1983) concluded that secondary teaching involved greater substantive complexity than the work

of accountants, salespersons, machinists, managers, and officials in service industries and in the retail trade.

Despite its complexity, from a cross-occupational perspective, teaching has long been characterized as an easy-entry occupation. Compared with other occupations and with the traditional professions in particular, teaching has a relatively low entry bar, and a relatively wide entry gate (Etzioni, 1969; Lortie, 1975; Ingersoll, 2001). In the United States, most of those who desire to enter the occupation are free to do so—individuals choose the occupation, not vice versa. In contrast, the opposite prevails in many occupations and most traditional professions, such as law, medicine, engineering, architecture, dentistry, and academia. Especially in the latter career fields, entry is highly selective, occupational gatekeepers have a large say in choosing new members and not all who desire to enter succeed in doing so. Placed in this context, entry to teaching is not especially restrictive or burdensome.

Finally, although teaching's entry training and licensing requirements are lower than those for many other lines of work in the United States, they are subject to far more skepticism and evaluation than for other lines of work. For most occupations and professions there has been little, if any, empirical research done assessing the value-added of practitioners having a particular credential, license or certification (Kane, 1994; American Educational Research Association/American Psychological Association/National Council on Measurement in Education, 1999). Such research can be difficult to undertake; if licensure is mandatory in an occupation, it is impossible to compare the performance of those licensed with those who are unlicensed. Nevertheless, occupational entry requirements, whether enforced by precedent or by law, are common. Indeed, it is illegal to do many lines of work, from plumbing and hairstyling to law and medicine, without a license. For example, almost all universities and colleges in the United States require a doctorate degree for full-time professorial positions. There is, of course, a growing secondary labor market in academia in which those without doctoral degrees are hired for various instructional or research positions, usually as nonpermanent employment. However, there are very few examples of a "professor effects" literature examining whether professors' qualifications have a positive effect on outcomes, such as student achievement (for a review, see e.g., Pascarella & Terenzini, 1991). In other words, in most occupations and professions in the United States, it typically is taken as a given that particular credentials are necessary to practice particular kinds of work.

In contrast, there is an extensive body of empirical research, going back decades, devoted to evaluating the effects of elementary and secondary teacher qualifications on teacher performance. Typically such studies try to assess the relationship between various measures of teacher preparation and various measures of student performance. And, contrary to the skeptics, a number of studies have indeed found teacher education and preparation, of one sort or another, to be significantly related to increases in student achievement (e.g., Greenwald, Hedges, & Laine, 1996). For example, in a multilevel analysis of data from the 1992 National Assessment of Educational Performance (NAEP), Raudenbush, Fotiu, and Cheong (1999) found teacher education in mathematics (as measured by a major in math or in math education) to be "consistently positively and highly significantly related to math proficiency" in eighth-grade students. Similarly, a recent analysis of 2000 NAEP data found that eighth-grade students whose math teachers had a regular teaching certificate in math, or had a major or minor in math or math education scored significantly higher on the eighth-grade math test (Greenberg, Rhodes, Ye, & Stancavage, 2004). These are telling findings given the widespread criticism from both insiders and outsiders that teacher education is of low quality in the United States.

However, accurately isolating and capturing the effects of teacher's qualifications on their students' achievement is difficult, and not surprisingly, the results of such research are, at times, mixed and contradictory. Moreover, there also are large gaps in this research (for a recent review, see Allen, 2003), further fueling the ongoing debate and fostering a large interest in further pursuit of this line of research. But, placed in this cross-occupational context, the mixed and limited quality of research documenting the value of entry requirements for teaching is not unusual; what is unusual is the existence of any such empirical research at all.

While perhaps more extreme and visible in the United States than other nations, similar concerns and debates surrounding teacher qualifications have been occurring across the world. Hence, besides adopting a cross-occupational perspective, another way to shed light and place such debates and issues in context is through cross-national comparisons. Such policy research can provide a useful function by comparing teaching's entry and training requirements among different countries. How do the qualifications of teachers differ between nations? This is the subject of this study.

The Research Project

Our study sought to address some of the above issues by examining the preparation and qualifications of elementary and secondary teachers in six nations and one autonomous region: China, Japan, South Korea, Singapore, Thailand, the United States, and Hong Kong. This project was begun in 2003 under the auspices of the larger Eight Nations Educational Research Program, a consortium devoted to comparative education research based at the University of Pennsylvania since 1993 and directed by Susan Fuhrman.

The selection of the seven systems in this study was not a result of any particular analytic strategy; their participation was simply a function of their membership in the existing Eight Nations consortium. However, the seven educational systems in our study do represent a wide range, providing useful contrasts. On one end of the range lies Singapore, a small city-state with about 500,000 students enrolled in 360 elementary and secondary schools. On the other end lies China, with over 212 million students enrolled in 485,000 elementary and secondary schools. Our seven systems also represent a wide range in terms of international student performance assessments. For instance, data from the Third International Math Science Study (TIMSS) on eighth-grade science and math student performance indicate four of our systems (Japan, Singapore, Hong Kong, and Korea) are well above average, while Thailand is below average. U.S. students typically perform slightly above average. But, there are exceptions to the latter. For instance, in the Progress in International Reading Literacy Study, fourth-grade American students perform better than students in almost all of the other 34 nations tested, including Hong Kong and Singapore (Mullis et al., 2003).

Our study was undertaken by a team of scholars and senior education officials. Members of the project team were Richard Ingersoll and Rebecca Maynard of the University of Pennsylvania; Ding Gang of East China Normal University in Shanghai, China; Kwok Chan Lai of the Hong Kong Institute of Education; Hidenori Fujita of the International Christian University in Tokyo, Japan; Eegyeong Kim of the Korean Educational Development Institute, Seoul, Korea; Steven Tan and Angela F. L. Wong of the National Institute of Education, Nanyang Technological University, Singapore; Pruet Siribanpitak of Chulalongkorn University in Bangkok, Thailand, and Siriporn Boonyananta of the Office of The Education Council in Thailand.

Unlike other recent cross-national teacher studies, this project adopted a relatively specific focus on one key issue linked to the performance and quality of teachers—the qualifications and preparation of teachers. Our objective was not to assess or to evaluate the links between teacher qualifications, teaching quality, and student achievement. We did not seek to prove that the qualifications required of teachers in any system are, or are not, beneficial or do, or do not, add value. Our study began with the premise, widely shared among the nations involved, that teacher qualifications are important. But, we did not presume a particular definition of a qualified teacher. Our objective was to compare how each system itself defines teacher qualifications and standards and then to address the question: how well are the different educational systems succeeding in ensuring all students are taught by qualified teachers? The study addressed this overarching issue by examining comparative data from the seven educational systems on three specific sets of research questions:

1.) *What Are the Preparation Requirements and Standards to Become a Teacher?*

2.) *What Are the Levels of Qualifications of the Current Teaching Force?*

3.) *What Proportions of Teachers Are Not Qualified in the Subjects They Teach?*

Teacher Preparation Requirements and Standards

Education Requirements

For education requirements, a four-year bachelor's or undergraduate degree is typically the standard for all of the systems. But, the different systems vary both within and across as to the level and years of education required, as shown in the column in Table 1 on minimal years of post-secondary education. In Hong Kong, teachers can gain entry with the equivalent of a two-year sub- or associate degree. In two systems—China and Singapore—the education required of elementary teachers is lower than that for secondary teachers—although in both of these systems there is movement to bring elementary teachers up to par with secondary teachers. For instance, in China a high school diploma is the minimum level necessary to enter elementary teaching, while upper secondary teachers must have a four-year college degree. In Singapore an elementary-level teacher can gain entry with the equivalent of a two-year sub- or associate degree, while at the secondary-level, Singapore requires teachers to complete a five-year program that includes a bachelor's degree plus a year of further coursework. In contrast, the other systems have similar degree standards for elementary and secondary teachers. For instance, a five-year program is the standard in Thailand for both elementary and secondary teachers. In the United States, teachers at both levels are required to hold a bachelor's degree.

Professional Training Requirements

All of the educational systems require prospective teachers to complete both educational and professional or occupation-specific, requirements to enter teaching. The latter are administered through teacher training institutions. The number of teacher-training schools or colleges in each system varies dramatically: Singapore has one; Hong Kong has four; Thailand has 56, Korea has 381, China has 618, Japan has 850. The United States stands out with the highest—1,206—almost double that of China, despite having about one quarter the students.

Each educational system has different variations in the sequencing and organization of its professional preparation. One variation merges professional preparation and licensing within a bachelor degree program; hence, educational and professional preparation are completed concurrently. Another variation separates the two; the degree is completed first, with the professional preparation and certification subsequent. In the United States, the latter is often referred to as a "fifth-year program"—a post-baccalaureate one-year teacher-preparation program leading to a teaching certificate. But only two systems—the United States and Hong Kong—have what is referred to as alternative certification routes into teaching, where candidates are not required to have completed professional preparation prior to employment, and where, for instance, the uncertified can begin teaching before or during their preparation and training.

All of the systems, with the exception of Hong Kong, require candidates to obtain a government-issued certificate or license signifying that a candidate has completed required professional preparation and training. Interestingly, in all systems the professional license requires both subject-matter and pedagogical preparation—expertise in both the "what" and the "how" of teaching—is required. In all of the systems, professional preparation includes a period in the field of supervised practice or student teaching prior to employment. As a result, in none of these systems do the rules stipulate that those with only a subject-matter degree (e.g., a degree in mathematics) are qualified to teach. Also, all of the systems with the exception of Hong Kong and Singapore require some kind of exam or test for prospective teachers. In some systems, these tests are administered as part of a teacher-preparation program; in others, they are administered by the school upon employment.

Because of its unusually decentralized character, there is some cross-state variation in these patterns in the United States. In 2002, the federal law known as the No Child Left Behind Act set a new and unprecedented goal—to ensure that elementary and secondary students in the United States are all taught by "highly qualified" teachers. The latter is defined as someone who has a bachelor's degree, who holds a regular or full state-

Table 1. Teacher Preparation Requirements and Standards, by System.

	Educational Qualifications				Professional Qualifications			
	High School Diploma	Associate or Sub- Degree	Bachelor's Degree	Minimum Years Post-Secondary Education	Subject-Area and Pedagogy	Certification and/or License	Test or Exam	Training During or After Degree
China								
Elementary	X			0	X	X	X	Both
L. Secondary		X		2	X	X	X	Both
U. Secondary			X	4	X	X	X	Both
Hong Kong								
Elementary		X		2-4	X			Both
Secondary		X		2-3	X			
Japan								
Elementary			X	4	X	X	X*	Both
Secondary			X	4	X	X	X*	Both
Korea								
Elementary			X	4	X	X	X*	During
Secondary			X	4	X	X	X*	Both
Singapore								
Elementary		X		2	X	X		Both
Secondary			X	4+1	X	X		Both
Thailand								
Elementary			X	4+1, 5	X	X	X*	Both
Secondary			X	4+1, 5	X	X	X*	Both
United States								
Elementary			X	4	X	X	X	Both
Secondary			X	4	X	X	X	Both

* Test or exam not required for license, but upon employment

approved teaching certificate or license and who is competent in each of the academic subjects they teach. But, the 50 individual states have leeway in the means by which teachers can establish "competency" in a subject. For example, some states require tests of prospective teachers while others do not, and the contents of tests vary, as do the minimum scores necessary to pass. Moreover, the federal requirements do not apply to teachers employed in private schools, and some states themselves do not require teachers in the private sector to hold a state license or certificate. However, the majority of teachers in private schools do in fact hold a regular teaching certificate. This is an instance, as in Hong Kong, where the reality exceeds the rule; that is, the level of preparation of the teaching force is above the official minimum required (more on this point in a later section).

Selectivity of Programs, Attractiveness of Careers

Listing the educational and professional requirements to become a teacher does not tell us a great deal of the rigor of these requirements, nor of the quality of these qualifications. Hence, our team examined data, where available, on the selectivity and competitiveness of entry, on the relative caliber and ability of those who enter teaching, and on the attractiveness, status and prestige accorded to teaching compared to other occupations. In

some cases, the data available were not highly comparable and, hence, our conclusions are limited. But in general we found that the different educational systems varied dramatically in these areas.

As mentioned earlier, in the United States the requirements to become an elementary- or secondary-level teacher have never been considered especially rigorous. As measured by college-entrance examination scores, those entering teaching in the United States tend to be in the average to low range compared with other college graduates (Henke, Chen, & Geis, 2000). To facilitate entry, the states early in the last century created large numbers of low-cost, dispersed, and noncompetitive teacher-training institutions and colleges.

Moreover, compared with the more prestigious traditional professions, teaching has been considered a less attractive and less desirable line of work. This has been especially true for males. Historically female-dominated occupations, such as teaching, have tended to have less prestige, lower pay and less authority (Hodson & Sullivan, 1995). Teachers rank in the middle range in surveys of occupational prestige, well below traditional higher-status professionals, such as physicians, scientists, engineers, architects, dentists, and attorneys, and well above blue-collar occupations such as, police, barbers, bakers, plumbers, and carpenters. There also is a striking status hierarchy within the realm of teaching itself, broadly defined. At the low end are pre-school and kindergarten teachers, then elementary teachers, followed by secondary-level teachers, and finally far above are those who teach in post-secondary institutions—professors (Ingersoll, 2001).

Many Asian nations have a tradition of respect for teachers. In Singapore, teacher-education students are among the top third in the nation academically. Relatively high salaries, comprehensive training, and full pay while undergoing training all make teaching an attractive career option in Singapore. In Hong Kong, teaching is ranked relatively high in occupational stature by senior-secondary school students—above accountants, engineers, scientists, doctors, and artists (Lai et al., 2005). However, the quality of new entrants to teaching has been a matter of concern in the Hong Kong. The occupation does not attract candidates with the highest academic achievement; the examination grades of new students admitted to teacher education programs in the comprehensive universities generally are lower than those admitted to other disciplines (University of Hong Kong, 2007).

In China, teachers also rank relatively high in surveys of occupational prestige—above, for example, fashion designers, corporate managers and mid-level military officers (Li et al., 2004). However, because teachers' salaries are low in China relative to other occupations, and especially low in rural areas, the occupation is not as attractive as some others. In Thailand, teaching is not considered to be an especially attractive occupation. Although there have been efforts to upgrade teacher salaries, they have been low when compared with professions—about 25% of physicians' and engineers' salaries. It is common in Thailand for teachers to work extra part-time jobs, resulting in inadequate attention to their teaching. As a result, among many of those enrolled in teacher-education institutions in Thailand, teaching was a second career choice.

In Korea, teaching is a relatively sought-after occupation because of its job security and its high social-status standing. Relatively competitive individuals aspire to enter teaching and the rate of teacher turnover is very low because most teachers remain in teaching until the point of retirement. In Japan, teaching is an attractive option to college students, is relatively well paid, enjoys respect, job autonomy, and a collaborative community with colleagues that affords chances to grow and develop as educators. Not surprisingly, turnover and quit rates have traditionally been low.

However, like the United States, many Asian systems have a status hierarchy within teaching, with elementary teachers at the low end, followed by secondary-level teachers, and professors at the high end. Moreover, in Japan and Korea as in the United States, teachers have come under increasing criticism in recent years (Fujita, 2000a; Ingersoll, 2003). A recent study of teachers' comparative status in Japan, China and the United Kingdom revealed that an overwhelming majority of teachers perceived their authority to be in decline. Moreover, less than half of teachers in

Japan reported they enjoyed "high social status." This was far higher than in the United Kingdom where only 17% reported this, but far lower than China, where fully 70% of teachers reported high social status (Fujita, 2006).

The Qualifications of the Teaching Force

Interestingly, the actual levels of education and professional training of the teaching force in each system are not necessarily predicted by official standards (see Table 2). In a number of systems, such as China, the reality does not reach the official standards. Sometimes, this situation arises because veteran teachers who were qualified at the time they first entered the classroom, do not meet newly upgraded standards.

On the other hand, in Hong Kong, reality exceeds the rule. While Hong Kong does not require entrants to hold a four-year baccalaureate degree, nevertheless most employed teachers do so. Sixty-six percent of elementary and 90% of secondary teachers hold a bachelor's degree or higher. Moreover, in Hong Kong the majority of teachers hold a teaching certificate, even though this is not required by law. There appear to be at least two incentives behind these high levels—credential-based salary incentives for teachers, and societal expectations and pressures on school administrators to hire university graduates, even if they cost more.

In the United States, reality exceeds the rule in some cases. Moreover, in other cases, it exceeds the rhetoric. As mentioned earlier, the majority of teachers in private schools hold a teaching certificate, even though one is not necessarily required. Moreover, over nine in 10 public school teachers hold a full teaching certificate, even though the conventional wisdom, trumpeted by the media and school reformers, is that there are significant numbers of uncertified teachers, especially in schools serving low-income, high-poverty communities.

For most of the seven systems, there is an elementary-secondary gap in teachers' qualifications, parallel to the elementary-secondary gap in standards, as discussed in the previous section. Elementary teachers often are less likely to hold a baccalaureate degree or a master's degree than are secondary teachers. For instance, in Singapore 48 percent of elementary teachers have a bachelor's degree, while about 89% do in secondary schools. It is important to note that teachers in Singapore who do not have bachelor's degrees nevertheless are required to undertake substantial pedagogical training and content coursework in their teaching subjects. In China, there are large proportions of teachers, even at the lower- secondary level, who do not hold a baccalaureate degree.

On the issue of professional requirements, in all of the systems the vast majority of teachers hold regular teaching certificates or licenses. But, again, there often is an elementary-secondary gap and currently in some nations, such as Singapore, there is a strong push to close the elementary-secondary qualifications gap. Interestingly, the gap does not always run the same direction. In Japan, there is a 12 percentage point elementary-secondary licensing gap, although this has been decreasing over time. In China, the elementary-secondary licensing gap runs the opposite way—elementary teachers are more likely than secondary teachers to hold a license.

Thailand and the United States represent exceptions—their data indicate that at both the elementary and secondary levels, most school teachers hold a baccalaureate degree, many hold a master's degree or higher, and most hold certificates. Indeed, in each nation elementary teachers actually are slightly more likely to hold certificates. Among the Asian nations, Thailand also stands out for its high level of degree holders at the elementary level.

For two of the systems (China, United States) we were able to obtain data on cross-school differences in some of the indicators in Table 2 to discern if there is a poverty gap in teachers' qualifications. The data from these two systems reveal distinct inequities in the qualifications of teachers accordingly to the poverty level of students. In each of these systems, students in poorer schools are less likely to be taught by teachers who hold a certificate and a higher degree.

While providing a useful portrait of the basic education and training of the teaching forces across systems, it also is important to acknowledge that the measures of degrees and certificates illustrated in Table 2 tell us little of

Table 2. Percent School Teachers, by Highest Degree Earned, and by Teaching Certificate, by System.

	Educational Qualifications			Professional Qualifications			Degree and Certification
	Less than Bachelor's Degree	Bachelor's Degree	Master's Degree or Higher	No Certification	Less-than-Full Certification	Full Certification	
China							
Elementary	95%	5%	0%	0%	2%	98%	5%
L. Secondary	71	29	.2	0	6	94	29
U. Secondary	21	79	1	0	20	80	80
Hong Kong							
Elementary	27	73	7	5	0	95	70
Secondary	8	92	25	5	0	95	88
Japan							
Elementary	15	82	3	0	15	85	85
Secondary	3	82	15	0	3	97	97
Korea							
Elementary	14	70	16	0	0	100	86
Secondary	.5	70	29	0	0	100	99
Singapore							
Elementary	52	46	2	0	0	100	48
Secondary	11	82	7	0	0	100	89
Thailand							
Elementary	8	88	4	0	8	92	92
Secondary	2	65	33	0	2	98	98
United States							
Elementary	1	54	44	4	6	89	89
Secondary	3	49	49	5	8	87	85

the quality of these requirements. Moreover, we do not have analogous national data on other indicators of quality and qualifications, such as teachers' exam or test scores. Hence, it is important to recognize there may be inadequacies or inequities not revealed by our data.

Teaching Assignments and Out-of-Field Teaching

Our study revealed dramatic differences across the educational systems in the extent to which there is the practice of out-of-field teaching—where teachers educated and trained in one field are assigned by school administrators to teach classes in another field. This is a crucial factor because highly qualified teachers may actually become highly unqualified if, once on the job, they are assigned to teach subjects for which they have little background. Teachers prepared, for example, in social studies may be unlikely to have a solid understanding of math, or how to teach it. In our study we used two measures: the percentage of secondary-level (grades 7-12) teachers in four core fields without an undergraduate or graduate *major* in the field, and the percentage of secondary-level (grades 7-12) teachers in four core fields without a full *teaching certificate or license* in the field.

The data revealed large differences across the systems in the percentages of teachers assigned to teach classes in fields that do not match their educational background. The

problem is most severe in the United States. For example, over one third of all those who teach secondary-school mathematics in the United States do not have a major in mathematics, mathematics education, or in related disciplines like engineering, statistics, or physics. Likewise, over one third of all those teaching secondary-school English classes do not have a major in English or related subjects such as literature, communications, speech, journalism, English education, or reading education. Twenty-nine percent of all those teaching secondary-school classes in any science do not have a college major in any one of the sciences or in science education. Similar proportions are found in the United States when looking at those without a teaching certificate in the field, as opposed to those without a degree.

Thailand and Hong Kong also have some problems with out-of-field teaching. In Thailand, about one quarter of those teaching math, social studies and Thai language do not hold majors in those fields. In Hong Kong, levels of out-of-field appear to approach those in the United States. Almost one third of those teaching math and social science do not have a certificate in those fields.

In contrast, there appears to be almost no out-of-field teaching at the secondary level in Japan. Korea also has very low levels of out-of-field teaching, with one large exception—science. Over one fourth of those teaching science in Korea do not hold a degree in one of the sciences.

In the two systems (Korea, United States) where data comparing different types of schools are available on out-of-field teaching, clear inequities exist. Teachers in high-poverty schools are more likely to be out-of-field. Indeed, in the United States, the most glaring and prominent source of inadequate access to qualified teachers is not a lack of basic education or professional training of teachers, but rather the widespread practice of misassignment.

Reasons for Out-of-Field Teaching

There appear to be a variety of reasons for the levels of out-of-field teaching reported for these systems, some having to do with how these measures are defined.

For instance, one factor contributing to the high levels of out-of-field teaching in science in Hong Kong is the manner in which the field is defined—a narrower and more stringent definition of a qualified teacher than used in other countries, such as the United States. A teacher with a background in chemistry who is teaching biology or physics is defined as out-of-field in Hong Kong. In contrast, in the U.S. data, we defined a qualified science teacher more broadly; in the U.S. data, anyone teaching any science is counted as in-field if they had a degree or a certificate in any of the sciences. If we redefine a "qualified" science teacher in the U.S. data as someone with a degree in the specific scientific discipline they are teaching (e.g., a chemistry teacher must have a degree in chemistry), then our estimates of out-of-field teaching would sharply rise accordingly.

Another factor in Hong Kong is the practice, especially prevalent at the middle grade levels and in lower-secondary schools, of routinely assigning teachers to teach multiple subjects. For instance, Chinese-language teachers often also teach Chinese history (in the field of social studies) and science teachers often teach mathematics—practices that increase the levels of out-of-field teaching in social studies and mathematics. These practices often are intended to bring about a more equitable workload among teachers. This may also account for the high levels of out-of-field teaching in science in Korea; 30% of lower-secondary science teachers have no certificate in science, while this is true for only 16% of science teachers at the upper-secondary level.

It also is true in the United States that teachers in the middle grade levels are routinely assigned to teach classes in multiple fields. It is common, for instance, for states to require teachers employed in middle schools (grades 5-8) to obtain a generalist degree or certificate in elementary education that emphasizes a broad background and does not require substantial specialization in any one subject. But, once employed, many such teachers are assigned to teach subject-matter courses to classes of different students all of most of the day, as if they are departmentalized secondary-level teachers. As a result, rates of out-of-field teaching are especially high at the middle-grade levels in the United States. However, in the U.S. data used in this

Table 3. Percent Secondary School Teachers in Four Academic Fields Without a Teaching Certificate or License in the Field Taught, by System.

	Native Language	Math	Science	Social Science /Studies
China	NA	NA	NA	NA
Hong Kong	15%	29%	17%	28%
Japan	.3%	1%	.2%	.5%
Korea	2%	10%	23%	2%
Singapore	NA	NA	NA	NA
Thailand	NA	NA	NA	NA
United States	29%	32%	29%	30%

NA – data not available

analysis, we were able to focus solely on teachers employed in secondary schools and were able to exclude seventh- and eighth-grade teachers employed in middle or elementary schools. This exclusion was not possible in the Hong Kong data, hence, inflating their figures.

In the United States, the data indicate that out-of-field teaching to a large extent is a result of the manner in which schools are organized and teachers are managed. School-staffing decisions usually follow a top-down command model: these decisions are the prerogative of school administrators, and teachers typically have little say over their assignments. School administrators face the difficult task of providing an increasingly broad array of programs with limited resources, time, budgets, and teaching staff. But, within those constraints, administrators have an unusual degree of discretion, and there is little centralized regulation over how teachers are utilized once they are hired. In this context, administrators report that, from a managerial perspective, they find that assigning teachers to teach out of their fields often is more convenient, less expensive, and less time-consuming than the alternatives.

For example, rather than hire a new part-time science teacher for two sections of a newly state-mandated science curriculum, an administrator may find it simpler and cheaper to assign two English or social-studies teachers to cover the science sections. When faced with a tough choice between hiring an unqualified candidate for a mathematics teacher position or doubling the class size of one of the fully qualified mathematics teachers, a school administrator might opt for the former. If a full-time music teacher is under contract, but student enrollment is sufficient to fill only three music classes, the principal may find it both necessary and cost effective in a given semester to assign the music teacher to teach two classes in English, in addition to the three classes in music, in order to employ the teacher for a regular full-time complement of five classes per semester. If a school has three full-time social-studies teachers, but needs to offer the equivalent of 3 1/2 full-time positions, and also has more than enough full-time English teachers, one solution would be to assign one of the English teachers to teach both English courses and some social-studies courses.

From a managerial perspective, these choices may save time and money for the school, and ultimately for the taxpayer. From an educational perspective they are not cost-free, as they are among the largest sources of underqualified teachers in schools in the United States.

Implications

This study revealed both commonalities and differences in the preparation and qualifications of teachers among the seven systems we examined. A question, reasonable to ask, but difficult to answer, is which approach is best? Our objective, however, was not to try to identify any one approach as better than another. Nor did we seek to document the necessity or value of teacher preparation and qualifications. Our objective was to describe the pre-employment preparation and qualifications standards, as well as the educational and professional training levels of teachers in each system. Our larger goal was to address the question: how well are these different educational systems succeeding in ensuring all students are taught by qualified teachers? How can this study help understand where problems may lie in meeting these needs?

Comparative educational research can provide a useful function by placing educational systems in context. There are a variety of possible reasons why elementary and secondary classrooms sometimes may not be staffed by qualified teachers. If educational reform is to succeed in solving the problem of underqualified teachers, it must address the major sources of the problem. Misdiagnoses can result in misguided or inadequate solutions to the problem.

Our study suggests at least three possible sources of the problem of underqualified teachers. One possible cause lies in the pre-employment requirements and standards themselves. The depth, breadth, and rigor of college or university teacher training and preparation requirements and of government licensing and certification standards are possible sources of inadequacies. In these cases, remedies must look to reform of institutional preparation programs or of government licensing requirements.

A second possible source of underqualified teachers lies in the failure of the teaching force to meet existing requirements and standards. This could be for a variety of reasons—including deficits in candidates' ability, education, preparation or training. Falling into this category are candidates who have not completed a required degree, lack adequate professional training, have not had adequate practice teaching, have not obtained a certificate or license, have not completed sufficient coursework in their major area of concentration, or are unable to pass required tests. Remedies must address the source of noncompliance with the standards and the reasons for gaps between rule and reality. Do those entering preparation institutions lack the ability to meet the requirements? Is the problem due to a qualification gap where an earlier generation veteran teachers do not meet newly upgraded standards? Does the problem lie with the adequacy of preparation programs and institutions themselves? Do they offer inadequate curricula or support for their students? Does the source of the problem lie at the point of hiring and employment? Do schools hire candidates who do not meet the existing standards? If so, is this because of an inadequate supply of willing and able applicants at the prevailing wage, or because of inadequacies in the hiring process itself?

A third source of underqualified teaching arises in how teachers are utilized once on the job—the problem of misassignment or out-of-field teaching. Again, remedies must address the actual source of noncompliance with the standards. Is the problem an inadequate supply of willing and able applicants, forcing those doing the hiring to accept underqualified candidates? Or does the problem lie in the way teachers, once on the job, are utilized in schools? If, for example, regardless of supply, many schools persist in assigning teachers to teach subjects that do not match their qualifications, then a close examination of the character of human-resource management in schools is necessary.

We will close this brief with a brief description of some possible implications of what we have found in this study relative to just one of the systems, that of the United States. Recent teacher policy and debate in the United States illustrates the importance of adequately understanding the source of the problem.

What counts, or should count, as the optimal content and rigor of entry requirements for new teachers has been a great source of contention in the United States as mentioned earlier. On one side are those who argue that entry into teaching should be more highly restricted, as in the traditional professions. On the other side are those who argue that entry into the teaching occupation already is

plagued by unusually restrictive and unnecessarily rigid bureaucratic entry barriers.

Compared with some other nations, the data reveal that entry into the teaching occupation in the United States does not appear to be especially restrictive, burdensome, rigorous, or difficult. The United States has more teacher training institutions than the other systems and overall entry is not especially selective. Moreover, unlike most other systems, prospective candidates in the United States can choose from a range of alternative certification and entry routes. Requiring prospective teachers to have both subject-matter and pedagogical expertise, as is common in the United States, also is not unusual; indeed all of the systems we studied required both. Notably, some systems, such as Singapore, have lower degree requirements than the United States, especially at the elementary level. But, teaching is a far more attractive and well-paid occupation in Singapore and, as a result, entry is highly selective and preparation highly rigorous, without such requirements. This is consistent with another recent study that compared filters and requirements embedded in the process of becoming a teacher across a number of countries, including Australia, England, Japan, Korea, Netherlands, Hong Kong, and Singapore and concluded that entry to teaching in the United States is relatively easy (Wang et al., 2003).

Regardless of the rigor and adequacy of entry requirements and standards, a second source of problems is the failure of teachers to meet the standards–the gap between rule and reality. Policy debates in the United States have underscored the tension between the need to maintain adequate entry requirements and the need to ensure an adequate incoming supply of new teaching candidates, especially given the high levels of teacher turnover. At times, this dynamic results in an apparent paradox where states develop more rigorous licensing requirements, while simultaneously passing legislation that waives such requirements to increase supply.

One lesson to be gleaned is that attempts to upgrade entry requirements cannot be implemented unilaterally. Without also upgrading rewards to a commensurate level, such initiatives most likely will falter. Some historians have held that earlier attempts to upgrade the caliber of teachers through more rigorous training and licensing standards or more selective entry gates often resulted in decreases in male entrants to teaching, who were more attracted to occupations with better rewards attached to rigorous standards (Strober & Tyack, 1980). A policy solution to the dilemma of trying to ensure sufficient supply, without lowering the bar, would be to simultaneously upgrade the quality and attractiveness of the job.

Another factor behind difficulties in ensuring that teachers meet standards has do with the adequacy of the recruitment and hiring process in some U.S. schools. Several studies have concluded that the staffing problems plaguing some low-income districts, in particular, are exacerbated by inadequate human-resource departments and flawed hiring policies (Odden, Milanowski, & Heneman, 2007). For instance, a study of four low-income urban districts in 2003 found that in each case there were more than enough qualified applicants to successfully fill existing vacancies. But, a cumbersome application process, layers of bureaucracy, inadequate customer service, poor data systems, late budget timetables, and seniority-based teacher transfer rules all undermined the ability of the districts to place qualified candidates in classrooms (New Teacher Project, 2004).

Finally, a related problem of human-resource management is the practice of misassignment. In contrast to most of the other systems in this study, the data indicate that a major source of underqualified teaching in the United States is the administrative practice of out-of-field teaching assignments. The data show that compared with some of the other nations in this study, this practice is especially widespread in the United States and especially in those schools serving disadvantaged communities.

Understanding the reasons behind underqualified teaching is important because of their implications for solving the problem. Most contemporary teacher-reform initiatives in the United States, in focusing on upgrading the training requirements of teachers and teacher recruitment, have overlooked the impact of the organizational and occupational contexts within which teachers work. The data, however, indicate that solutions to the problem of underqualified teachers also must look to how schools are managed and how

teachers are utilized once they are on the job. In short, recruiting thousands of new candidates and providing them with rigorous preparation will not solve the problem if large numbers of teachers receive assignments for which they are not prepared.

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Richard M. Ingersoll is Professor of Education and Sociology at the University of Pennsylvania in Philadelphia. Dr. Ingersoll's research is concerned with the character of elementary and secondary schools as workplaces, teachers as employees, and teaching as a job. He has published numerous articles, reports, and pieces on the management and organization of schools, the problem of underqualified teachers, the debate over school accountability, the problems of teacher turnover and teacher shortages, the status of teaching as a profession, and the degree to which schools are centralized or decentralized and that impact on school performance. He has been published widely on the problems of teacher shortages and underqualified teachers.

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