

successful countries. Exploration into this area, however, reveals wide variability in the structure, content and character of teacher education, yet recent large-scale comparative studies of teacher education, such as TEDS-M, reveal common features shared among successful programmes, such as emphasis on content and pedagogical knowledge, strong links between theory and practice, and an inquiry orientation. In addition, rigorous selection and graduation requirements and careful induction into the profession seem to add to the strength of programme design. Nevertheless current teacher education policy in countries such as England and the US, among others, continues to be influenced more by ideology, politics and tradition than by evidence of what works as shown by rigorous research. An important question for the field of teacher education is how to boost the use of research results to influence teacher education design as indicated by successful practice. This paper shares current research findings on models of teacher education in systems that, according to the McKinsey Report of 2010, range from excellent to fair, highlighting those features characterizing teacher education in the successful countries. The evidence shows that systems that perform at high levels have made efforts to develop teaching as a profession by developing highly coherent and structured programmes typically requiring graduate-level education for future teachers (or equivalent), encouraging a strong (inquiry-oriented) link between theory and practice around curriculum and instruction, and developing effective partnerships between universities and schools. Preparing teachers in this manner allows the system to devolve instructional responsibility to teachers, and makes it possible for them to tailor instruction to a growingly diverse student population, and to continue learning and innovating from and with peers.

INTRODUCTION¹

Policy discussion is occurring in a more demanding context for teachers and teacher education because knowledge is more complex, the expectations of what a learned person should know and be able to do have changed, and views of effective teaching and learning are diverse. This transition comes with questioning of what we currently do in education, and it has renewed long-standing discussion on what makes a good teacher and what constitutes effective preparation to teach.

The international literature reviewed for this paper reflects these trends. Policy, practice and research in teacher education revolve around two enduring questions: whether effective teachers are born or made, and whether teaching is a craft or a profession. To a degree these positions create false dichotomies, but answering these questions merits discussion because

they reflect issues in the content and structure of the education provided to teachers and their level of preparation to teach.

Conceiving effective teachers as having innate qualities limits the role of teacher preparation and places trust in identifying, recruiting and retaining 'gifted' individuals, a condition that may be met in wealthy, homogeneous and small countries, but is more difficult to achieve otherwise. If, instead, the premise is that individuals can learn to be effective teachers, the task becomes finding evidence for best practices, and developing learning experiences leading to that end -- a significant and challenging task that is more inclusive and capacity-development oriented. Similarly, seeing teaching as a craft places future teachers in an apprenticeship role, where learning depends on practitioners assumed to be masters of their craft. In contrast, that teaching is a profession has a series of expectations for individual teachers and for the profession as outlined below.

For those occupations seen as a profession, such as teaching, several requirements have to be met, such as specialized knowledge, intensive academic preparation, and the ability to use autonomy in judgments, inquiry in learning to innovate, and flexibility in undertaking different courses of action as required by specific circumstances. For the profession overall, there needs to be regulation based on professional standards determined by peers (accountability); transparency, scrutiny and mutual trust in using mechanisms to maintain and improve quality (accreditation); and constant engagement in pursuing evidence-based knowledge to guide policy and practice, and withstand political and ideological scrutiny.

THE ROLE OF RESEARCH IN TEACHER EDUCATION

A review of the international research on teaching quality and development commissioned by the US National Academy of Sciences (NAS) in 2000 uncovered, among other things, a typology of the different kinds of empirical research undertaken in the field (Tatto, 2000). Understanding research as 'systematic investigation or inquiry aimed at contributing to knowledge' (OED Online, 2013), in this case the factors that contribute to the development of teacher quality, the review found that educational research findings emerged mostly from three main kinds of endeavors which result in the production of valuable local knowledge but are not robust enough to provide guidance for policy; a fourth type is still rare and much needed to inform the development of teacher quality.

The *first* and most frequent type is small-scale research done by teacher educators on their own practice, and to explore issues having to do with teaching and learning

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in their discipline, or with education broadly defined. Important insights come from this type of research on the relation between teacher education strategies and teacher learning. The *second* type is small-scale research done by teacher educators in collaboration with school-based partners or with interns to understand issues related to situated practice and its influence on pupils learning. This includes research done by teacher educators with practicing teachers, and/or with future teachers as part of their programme's requirement (and as reported by teacher educators). This research reveals the extent to which inquiry in and for practice helps future and practicing teachers to better understand their own practice and their pupils' learning, and increases opportunities to develop professionally. The *third* type of educational research endeavor is programme level research as part of self-study or accreditation requirements. This type of research may include collaborative efforts among administrators, teacher educators, teacher candidates and partner schools to understand the extent to which teacher education programmes are achieving particular goals. This research may explore the extent to which a number of programme features influence what future teachers learn and do and how this translates into pupil learning as well. This research can provide important insights for programme improvement.

The *fourth* type conceived as systemic-policy-oriented research is larger in scale and is directed at studying the processes of teacher education from entry requirements, to opportunities to learn, to outcomes and to impact once in the classroom, system-wide. The main goal of the review was to find studies of this kind; instead the review uncovered only a few studies mostly in the school effectiveness tradition, done by economists, which partially explored these different dimensions of teacher education. The review revealed that the field lacked a well-developed research infrastructure to adequately study teacher education trajectories. The lack of this infrastructure resulted in studies that disregarded teacher education programmes' theory of action and used poor or erroneous indicators of teacher education outcomes (such as accumulated years of education) resulting in reports of no-effect. The field still suffers from the conclusions reached by some of these research studies. Unlike other disciplines, education researchers were not undertaking this kind of research; the report thus called for federally and local support of large-scale rigorous research programmes on the development of teacher quality, such as that existing in other disciplines. This research type is designed to significantly add to the knowledge base of the discipline (in this case teacher education, teaching and learning); it is generative and creates capacity, is expected to inform policy, is open to scrutiny, and is subject to non-partisan peer review. The NAS review served as background for the development of a framework for such a study, the Teacher Education and Development Study in Mathematics (TEDS-M), (Tatto, 2008; Tatto et al, 2008).

Systematic, rigorous, collaborative, and comparative research, such as done in the Teacher Education and Development Study in Mathematics (TEDS-M), funded by the US National Science Foundation and the participating countries, is a helpful model for developing capacity to produce evidence-based knowledge for the profession. TEDS-M is an international and comparative study of primary and secondary mathematics teacher education. It examined how different countries prepare their teachers to teach mathematics in primary and lower-secondary schools, paying particular attention to links between teacher education policies, practices and outcomes. By participating in the study, countries were provided with an opportunity to develop capacity to conduct research on their own teacher education system and to learn from the approaches used in other countries. TEDS-M asked several key research questions: What is the national policy context for mathematics teacher education? What are the main characteristics of mathematics teacher education programmes, and how do they vary across countries? What is the level of mathematics and related teaching knowledge acquired by prospective primary and secondary mathematics teachers?

TEDS-M gathered data in 2008 from approximately 22,000 future teachers from 750 programmes in about 500 teacher education institutions in 17 countries including Botswana, Canada, Chile, Chinese Taipei, Georgia, Germany, Malaysia, Norway, Oman, Philippines, Poland, Russian Federation, Singapore, Spain, Switzerland (German speaking region), Thailand and the United States. Teaching staff within these programmes (close to 5,000 mathematics and general pedagogy educators) also participated. The study has produced seven reports and a rich and publicly available database from the international data, and individual country reports exist as well.

Key findings from the study show that all the countries included in the study rely on university-based teacher education approaches to prepare the majority of their future teachers. These approaches however have important distinct features, such as entry requirements, type of programmes (for example, concurrent or consecutive), the emphasis given in the curriculum of different aspects considered important to teaching and learning to teach, the length of programmes considered necessary to prepare teachers for the classroom, and the amount of class time the teacher education programmes allocate to mathematics and mathematics pedagogy (versus general pedagogy for example). Countries known for their students' high achievement in mathematics, such as Chinese Taipei and Singapore, also safeguard the high quality of entrants to teacher education, and have developed strong mechanisms for making sure that future teacher graduates meet high standards of performance before gaining certification and full entry to the profession (including receiving

passing grades in all subjects, written/oral examinations and/or theses, and carefully monitored field experiences and/or practicum in partner schools. These successful systems have strong systems for reviewing, assessing and accrediting teacher education providers.

A distinctive feature of TEDS-M was the development of assessments to study the knowledge for teaching mathematics future teachers gained as a result of teacher education. In TEDS-M, items to assess content knowledge for primary and lower-secondary levels covered number and operations, algebra and functions, geometry and measurement, and data and chance in one of three cognitive sub-domains: knowing, applying and reasoning. Items addressing mathematics pedagogical knowledge spanned three domains: curricular knowledge, planning for teaching and learning, and enacting teaching and learning. Future teachers in Chinese Taipei and Singapore performed the best, and future teachers in Russia also scored highly. Poland, Switzerland and Germany did well partly because they rely more on mathematics specialist teachers in lower grades. Future teachers in Norway performed very well on mathematics pedagogical knowledge items. In general, future teachers' own depth of mathematical understanding seemed to influence their ability to interpret students' thinking or to determine appropriate responses to students. Future teachers' beliefs about mathematics and mathematics learning were related to the depth and breadth of their mathematics knowledge for teaching (for instance future teachers who believed that mathematics is a set of rules and procedures, learning mathematics requires following teacher direction, and mathematics is a fixed ability tended to show relatively lower levels of mathematics content and pedagogy knowledge, than those future teachers who believed that mathematics is a process of inquiry and that learning mathematics requires active involvement. Consistently, the pattern of beliefs held by the future teachers in every country matched the pattern of beliefs held by the teacher educators.

TEDS-M "represents the first large-scale international study of the preparation of primary and lower-secondary teachers and its outcomes, it provides information useful for policy makers in their reform efforts aimed at increasing teacher quality, starting from making teaching an attractive career and ensuring the quality of entrants to teacher education programmes, to developing a strong system of reviewing and accrediting teacher education providers, to implementing high standards of performance for those entering the teaching profession" (Wagemaker, 2012).

The most important lesson from TEDS-M is that the higher achieving countries do rely on university-based teacher education to produce high quality graduates. One consistent feature of highly successful systems, such

as those identified by TEDS-M, is a research-informed-curriculum for programmes and teacher educators, high selectivity criteria, and strong quality assurance mechanisms. This is the case of successful TEDS-M countries such as Taiwan and Singapore, and for several institutions in the US (this is also true for Finland, which did not participate in TEDS-M). TEDS-M also shows that in countries challenged by economic or social hardship, relaxed accountability systems and market regimes, teacher education has difficulty meeting its goals.

This paper's next section examines the experience of four countries' teacher education: Finland, Singapore, the United States and Chile. Of interest is exploring paths for integrating research into teacher education practice, elucidating the degree to which research types discussed above are evident in programme design, as well as how and whether other system features (as delineated by Mourshed, Chijioke & Barber, 2010) amplify or reduce these efforts. The first systems examined are Finland and Singapore, special cases with small populations and excellent results in international tests, yet with different approaches to education, teacher education and quality assurance. The United States follows as a multi-partite system in constant state of change, aimed at improving its performance in international tests and whose approach to educating teachers and to standards-based reform and quality assurance have been emulated throughout the world. Lastly, Chile's system operates under a strong market model, showing low performance in international tests, and is currently implementing the most comprehensive accountability reform in Latin America, in hopes of increasing students' learning.

Relevant demographics about the countries selected are in Exhibit 1; more detailed information about the systems in each country is in Appendix 1.

FOUR COUNTRY CASES

The four country cases were selected to represent each of the levels defined in the McKinsey Report (Mourshed, Chijioke & Barber, 2010) and according to innovations (common and unique) that characterize the performance level in each system (see Exhibits 2 and 3). Finland is the only country classified as 'excellent'; while Singapore is one of five countries classified as 'great'. The US is one of 22 countries classified as 'good', and Chile is classified as 'fair' and since the 1994 education reform, as a 'promising starter' per student assessment data (2001-2007). According to Mourshed, Chijioke & Barber (2010), systems in their trajectory toward improvement begin with centralized, rigid standards, and even scripted instruction but as systems improve there is a shift from central guidance to decentralized responsibility to teachers and schools accompanied by instructional flexibility and autonomy, school-based collaboration and self-evaluation (Exhibit 2). Thus while

in the early stages systems are most concerned with the improvement of basic literacy and numeracy levels and with establishing the system's foundations (such as building data gathering systems, organizations, financial systems and pedagogy), those in a more advanced stage of improvement are concerned with shaping the teaching profession 'such that its requirements, practices, and career paths are as clearly defined as those in the established professions such as medicine and law'; and encouraging horizontal learning, through peers, and educational innovation (Exhibit 3).

We would expect that those systems that are turning greater responsibility to teachers would have more developed systems for professional education and that the vision of what teachers are expected to be able to know and do would shape their preparation. For example, if teachers are expected to innovate then they should be able to engage in inquiry projects that would enable them to gather evidence to support such innovations. Conversely we would expect that systems that begin at a lower level of improvement would have neither such a highly developed system of teacher education nor such high expectations from their teachers.

The country systems selected for analysis in this paper fall along the continuum described by Mourshed, Chijioke & Barber (2010), and we will expect that their teacher education models would vary accordingly.

Finland initiated the development of teacher education in the 70s along with the core curriculum reform, and for close to 20 years maintained a strict control of the system. The expectations for teachers were high and accordingly they were required to be qualified at the Master level and to learn to do research on and for their practice. Only relatively recently there has been a shift from central guidance to school-based collaboration, self-evaluation, and peer learning and encouragement to do research and innovate. Nevertheless, the state is very much a regulatory force, maintains the core curriculum as a coherent force, yet decentralizes responsibility to schools and teachers and encourages instructional autonomy. Importantly in Finland, the market is not allowed to operate in teacher education and teachers' system of salary and rewards are at the same level of other highly regarded professionals.

Singapore has maintained a high level of performance for many years; its model for teacher education requires high levels of academic as well as pedagogical knowledge, a well monitored school practicum, plus a high-stakes induction period where prospective teachers are carefully evaluated before they are declared as ready to teach. Singapore's goal as concerns teachers is focused on 'shaping the professional'. The state is very much a regulatory force with the system operating under central guidance, yet teachers are encouraged to learn

through peers and to be creative in their practice. As in Finland, markets are not allowed to operate.

The USA is a system (or combination of many systems) much larger than Finland and Singapore and with high levels of diversity. Consequently teacher education in the US has been shaped by a mixture of priorities, from the formation of teachers as professionals under models that have been emulated across the world (including Finland and Singapore!) to programmes that challenge the need for high levels of professional preparation for teachers (such as Teach for America). In the 1990s the US saw the rapid emergence of the so called 'alternate routes', which range from strong to no connection with teacher education programmes in universities. While markets are allowed to operate at all levels of the system, there has been an increase in regulation and a centralization of controls including the introduction of curriculum standards, and other accountability mandates linked to accreditation. Under this new accountability regime university-based teacher educators have found themselves working frantically to build information systems to document their worth and maintain their accreditation status. Interestingly, no similar mechanisms to accredit non-university-based alternate routes yet exist. In short, there is increased central guidance, regulation through standards, and outside evaluation, and, unlike Finland and Singapore, markets are allowed to operate.

In Chile the most important priorities are achieving basic literacy and numeracy for the vast majority of their disadvantaged population (and their teachers), and to redevelop the foundations of a teacher education system that was destroyed under the Pinochet dictatorship. After the dictatorship and under a new regime, teacher education became part of the higher education system and concerted efforts began to develop the curriculum, resources and infrastructure for its programmes. Paradoxically, university-based teacher education is once again confronting serious challenges as a result of government policies that have allowed the market to operate in all levels of the system, resulting in the proliferation of private and until recently unregulated programmes for teacher preparation (now dominating close to 60% of the provision). The state has recently instituted accreditation measures in an attempt at controlling the proliferation of low-quality private providers. According to current legislation, university-based teacher education will soon change its curriculum to provide more specialized knowledge of the subject and subject pedagogy to future teachers, but it is uncertain whether, and the degree to which, these reforms will affect private providers.

Thus while all these systems are committed to teacher education and have programmes that are designed to educate teachers, not all teacher education is equally

effective as evidenced by the recently published TEDS-M study (see Tatto et al, 2012 for the full report).

While Finland did not participate in TEDS-M, all the other countries included in this paper did. The assessments results are in Exhibit 1 and show the marked difference between Singapore and the other three countries. The US and Finland are more like each other while Chile is far behind. Most importantly the opportunities to learn afforded future teachers (as shown in Exhibits 4 and 5) are consistent with the system's expectation and resonate with the words of Mourshed, Chijioke & Barber (2010): "the system's context might not determine what needs to be done, but it does determine how it is done", and how much change and progress can be expected as culture and tradition may subvert attempts for positive change (Mourshed, Chijioke & Barber, 2010).

Exhibit 6 provides an overview of the typology used in the next pages to describe the models of teacher education in the four countries.

FINLAND

Guiding Philosophy, Regulation and Selectivity

Teacher education in Finland is characterized by an "orientation to professionally and personally autonomous acting and flexible curricular structures; the development of professional problem solving capacity; inquiry oriented learning as well as professionally relevant research and development; action oriented learning in concrete (group) projects; cultivation of learning in virtual learning environs; and permanent evaluation studies on the current state of teacher education studies" (University of Helsinki website). The teaching profession is regulated by the Teaching Qualifications Decrees 986/1998 and 865/2005. Teaching is an attractive career, with a strong demand for teacher education places, and a very low acceptance rate.

Locus of Control and Curricular Demand

The Departments of Teacher Education in eight Finnish universities are in charge of teacher education. Teaching practice occurs in Teacher Training Schools governed by the universities. Student teachers may also do their practice at the so-called network of selected Field Schools. To be a qualified subject teacher in a comprehensive school (Grades 1 to 9), a person must have completed a higher University degree (a Master's degree), at least basic and intermediate or equivalent studies of 60 European Credit Transfer and Accumulation System (ECTS) credits (35 study weeks) in a subject that is taught in comprehensive schools, and 60 ECTS of pedagogical studies for teaching. To be a qualified subject teacher in the upper secondary school, a person must have completed a higher University degree (a Master's degree), at least 120 ECTS credits in one teaching subject that is taught in the upper

secondary school and at least 60 credits in other teaching subject, and at least 60 ECTS of pedagogical studies for teaching. In order to be qualified to teach in a Finnish basic school and upper secondary school, teachers must also possess excellent competence in the teaching language of the school. 'Pedagogical studies', including academic studies in subject matter methodology and teaching practice, have to add up to approximately 50 ECTS credits. This implies that prospective primary level teachers have to prepare their academic/scientific Master's thesis in pedagogy, and secondary level teachers in another academic discipline (although suggestion is made to deal with topics with relevance for subject matter methodology). Within their pedagogical studies, all prospective teachers have to take approximately 22 ECTS credits of teaching practice.

These studies are organized by model schools integral to the Departments of Teacher Education, and in practice periods at regular schools. Successful completion of the study programmes with a Master's degree allows graduates to apply for teaching positions without taking additional exams or a probationary period. The Finnish model of teacher education may be characterized as an integrated, one-phase approach, and it enables graduates to continue postgraduate studies (for example doctoral studies) without barriers (Scheinin, 2009).

Approach to Teacher Education

Finland's well known commitment to research-based teacher education gives educational theories, research and practice important roles in preparation programmes (Sahlberg, 2010). The teacher education curriculum is designed as a systematic pathway aligning the foundations of educational thinking to educational research methodologies and educational science, to help students understand the systemic, interdisciplinary nature of educational practice, and to learn how to design, conduct and present original research on practical or theoretical aspects of education (Sahlberg, 2010). According to Sahlberg (2010), all eight universities offering teacher education in Finland have their own strategies and curricula that are coordinated to ensure coherence, but are 'locally crafted' to make the best use of the university's resources.

Another important element of Finnish teacher education is practical training in schools, which is seen as a key component of the curriculum, along with classroom assessment and school-based evaluation. Over the five-year programme, candidates advance from basic to advanced practice and then to final practice. During each phase, students observe experienced teachers, practice teaching observed by supervisory teachers, and deliver lessons to different groups of pupils while being evaluated by supervising teachers and professors from the Teacher Education Department. There are two kinds of practicum within teacher education programmes in Finland. The first

occurs in seminars and small classes in the Department of Education, where students practice basic teaching skills with their peers. The second happens mostly in special Teacher Training Schools governed by universities, which have similar curricula and practices as public schools. Some student teachers also practice in selected Field Schools. Primary school teacher education students devote 15% of their time to practice teaching in schools. In subject-area teacher education, practice teaching comprises one third of the curriculum. Schools with practice teaching have higher professional staff requirements; supervising teachers have to prove they are competent to work with student teachers.

Teacher Training Schools pursue research and development roles in collaboration with the Department of Teacher Education and with the academic faculties which also have teacher education functions. These schools introduce sample lessons and alternative curricular designs to student teachers, and have teachers who are well-prepared in supervision and teacher professional development and assessment strategies.

Vision of Future Teachers

Finnish teachers learn to reflect on their own practice and take on significant responsibility for curriculum and assessment, as well as experimentation with, and improvement of, teaching methods. Teacher education is based on the idea of the teacher as researcher, teachers are trained to reflect and analyze their work, think scientifically, examine their own world of values, and adjust their teaching continuously (Makinen, 2010).

In conclusion, according to the common innovations shared by successful systems, Finland emerges as a highly functioning system with a stable structure, resources and processes in place. Finland in a relatively short time period has effectively introduced policy and education laws, has a 'core' curriculum which serves as a regulatory force to create system coherence (including teacher education), has a highly developed, selective and demanding system which in partnership with schools builds the instructional skills of teachers, and appropriate teacher remuneration and rewards. In contrast with other systems, high stakes student assessments do not begin until the end of the comprehensive school.

Finland has a well-developed data system which is continuously improving. In Finland the state is strong and is able to effectively enact its mediating role yet devolving responsibilities to localities including schools and teachers (who teach with a certain degree of flexibility and autonomy). The Finnish Ministry of Education acts as the main funder of teacher education research and more general research undertakings. The Finnish approach to inquiry-based learning permeates all institutions of education, including teacher education and teachers.

SINGAPORE

Guiding Philosophy, Regulation and Selectivity

Singapore's teacher education programmes have been revised four times, most recently in 2009, in response to new ideas about teacher education from international trends and to meet changing demands of the education system (Wong et al, 2012). The new framework is called TE21 and it was proposed as a model for the 21st Century (NIE, 2009). The goal is to develop active, creative and critical thinking teachers, learners and schools within an accountability culture. The National Institute of Education (NIE), an autonomous institute of Nanyang Technological University, is the sole teacher education institution in Singapore. Teachers are recruited by the Ministry of Education (MOE) and sent to NIE for training. Graduating from NIE automatically qualifies candidates to teach in the public schools.

To become a qualified teacher in Singapore, candidates have to 'have the passion for teaching and strong personal attributes and values'. In addition they must be highly knowledgeable. Entry to teacher education is selective, candidates must possess one of the following entry qualifications: University degree; Polytechnic Diploma, with five 'O' Level passes including English and Mathematics; or two 'A' Level passes and two 'AO' Level passes (including General Paper) at one or two sittings, with five 'O' Level passes including English and Mathematics. Two 'A' /H2 Level passes and two 'AO' / H1 Level passes (including General Paper or KI) and where applicable, five 'O' Level passes including English and Mathematics; or a good overall IB (International Baccalaureate) Diploma score and where applicable, five 'O' Level passes (including English and Mathematics). Candidates enroll in the teacher education programme, which requires a minimum of 3.5 years to complete and a maximum of six years.

Locus of Control and Curricular Demand

In contrast with basic education, there are no national curriculum requirements in teacher education for Singapore (Wong et al, 2012). However, the contents of the teacher education curriculum are determined by teacher educators and the Foundation Programme Office in the National Institute of Education (NIE), according to the best knowledge in the field and from their own evaluation studies. As of July 2007, each programme included core courses in education studies, curriculum studies, subject knowledge, academic studies (in the A degree programme only), practicum, language enhancement and academic discourse skills. Subject knowledge courses help student teachers gain a deeper understanding of the content of the subjects they are trained to teach. Teacher education is aligned with the curriculum studies courses offered at the primary education level (grades 1 to 6), at the secondary education level (grades 7 to 10), and at the post-secondary education (grades 11 and 12). Teachers

are trained in four concurrent and four consecutive programmes. The concurrent programmes include two variants of a general diploma programme (2 years), and a BA (Education) or BSc (Education) degree programme (four years). The primary diploma has two options to learn to teach two or three subjects. The consecutive programmes are called Postgraduate Diplomas in Education (PGDE programmes) for either primary or secondary teaching for candidates who have already gained a four-year degree and afterwards enroll in this one year of teacher education training. Within the school system, about 75% of the teaching force graduates from one of these programmes, and the remaining 25% are non-graduates. The yearly enrollments in various programmes fluctuate considerably.

Approach to Teacher Education

In addition to learning the knowledge associated with the school curriculum, a central element of learning to teach in Singapore is the practicum experience. The practicum field component requires student teachers to be in assigned schools to develop teaching skills and link theory to practice. During their teaching assistantship, student teachers observe their co-operating teachers, help them plan lessons, perform guided teaching, and reflect on the roles of teachers; during their teaching practice, student teachers conduct supervised lessons and engage in other school activities. Every student teacher is assigned an assessment panel of their senior mentor, one or more cooperating teachers, and one NIE supervisor. Candidates' performance in the practicum counts toward 23% of the academic credits in the 'diploma programme' (a five-week teaching assistantship at the end of year one, and ten weeks of teaching practice at the end of year two); 16% of credits in the 'degree programme' (two weeks of school experience before the beginning of year two in a primary and a secondary school, five weeks of teaching assistantship after year two to observe lessons and to reflect on the roles and responsibilities of teachers, five weeks of a teaching practice after year three to begin independent teaching, and ten weeks of teaching practice in year four, when they are expected to teach independently and to learn more about the roles of teachers). The practicum of the PGDE programme counts for 25% of the credits (a ten-week attachment to a primary or a secondary school, in which the student teachers are expected to teach the assigned curriculum subjects).

According to Wong et al (2012), graduates from NIE are posted to schools as trained teachers. They serve under a bond of three years (those with a diploma or a PGDE), four years (those with a degree), or up to six years (those with an MOE scholarship). During their first year in school as trained teachers, they are on probation. During the initial years, beginning teachers undergo the Structured Mentoring Programme (SMP), introduced in 2006, including an induction component at the school,

cluster and MOE levels, to provide these teachers with an overview of the education system and school culture; school-level mentoring to address job expectations and day-to-day operations as a teacher; and practice-oriented training in classroom management, basic counseling skills, assessment skills, reflective practice, and planning their own development. Experienced teachers who serve as school-level mentors are given training in mentoring and counseling skills. The practice of involving school teachers in supervising student teachers and grading their teaching performance is an important relationship that NIE has carefully nurtured with the schools over the years.

Vision of Future Teachers

The NIE's goal is to prepare competent teachers to implement an inquiry-based curriculum and the national vision for Singapore schools (Wong, 2008).

In conclusion, similar to Finland, and according to the common innovations shared by successful systems, the analysis of Singapore indicates a highly functioning system which has undergone and continues to undergo important structure, resource and process change. Singapore has effectively introduced policy and education laws, has revised and continues to revise standards and curriculum, continues to build the instructional skills of teachers, and to insure appropriate teacher remuneration and rewards, while assessing student learning and improving their data system. Singapore is a highly centralized system and the state is able to control the school curriculum and, albeit indirectly, the teacher education curriculum. National and international research has an important role in the development of teacher education curriculum, teaching, and overall system improvement. Most of the research in education is done at NIE with funding from the Ministry of Education, in collaboration with experts and practitioners. Teacher educators are encouraged to do and publish research. The MOE encourages teachers to do action research and many teachers do take part, also participating in NIE education research as collaborators. Evaluation research for quality assurance is done by a special evaluation office at the NIE.

USA

Guiding Philosophy, Regulation and Selectivity

There is not a unified guiding philosophy for teacher education in the United States. Currently, more than 1,300 public and private colleges and universities, school districts, state agencies and private organizations offer teacher education for future primary and secondary teachers in the US. Alternate routes have grown significantly since 1998, with the notion that they can better provide teachers for high-need subject matter areas or high-need locations. By the academic year of 2004-2005, approximately 50,000 teachers (about 33% of all teachers hired that year) entered through alternate routes. Regulation has intensified and has become externally

oriented over the years. Accreditation based on self-study and evidence-based self-improvement became more prominent in 1997 with the creation of the Teacher Education Accreditation Council (TEAC) which advocated the notion that the “accreditation process [should be] built around the programme’s case that it prepares competent, caring, and qualified professional educators [...] the programme [is expected] to have evidence to support its case, and the accreditation process examines and verifies the evidence.” This approach was an alternative to the long-standing National Council for Accreditation of Teacher Education (NCATE) advocating a more external approach. Recently and given federal and state pressure both bodies began requiring performance-based accreditation asking programmes to demonstrate that their graduates acquired relevant subject matter knowledge and teaching skills, and could teach competently. Programmes were expected to indicate how they assess candidates according to programme standards, and to document assessments’ validity and reliability.

Yet accreditation at the national level is not required; thus, while teacher education programmes in more than 40 states can obtain national accreditation in addition to state approval, in some state programmes can substitute national accreditation for state accreditation (Youngs & Grogan, 2012). Recently the accreditation body has mutated with the creation of CAEP (Council for the Accreditation of Educator Preparation), an amalgamation of TEAC and NCATE, and released new standards (in August 2013) bringing back the self-study idea. CAEP requires that “educator preparation providers (EPPs) seeking accreditation complete a self study and host a site visit through which the accreditor determines whether or not the provider meets CAEP standards related to evidence of candidate performance, use of data in programme self-improvement, and institutional/organizational capacity and commitment for quality” The five standards ask for evidence of (a) content and pedagogical knowledge; (b) clinical partnerships and practice; (c) candidate quality, recruitment, and selectivity; (d) programme impact; and (e) provider quality assurance and continuous improvement” (CAEP, 2013).

Regarding selectivity, while there is increased competition for teacher education, universities still train the majority of pre-service teachers, and few have limits or quotas because attraction to teaching is mixed and competition for study places is minimal. Consequently, teaching candidates in highly competitive fields tend to be weak (for example, elementary education candidates tend to have lower SAT scores in mathematics than the average college graduate). Entry into teacher education requires completion of upper secondary school, and additional requirements vary by teacher preparation institutions and states. While no specific subject requirements exist for future primary teachers, subject matter at the university level is a requirement for future secondary teachers.

There are no particular requirements on staffing other than the education degrees for faculty in universities, and a moderate amount of experience and good reputation in the selection of collaborating teachers.

Locus of Control and Curricular Demand

Colleges and universities are still the major providers of teacher education. Most primary and lower secondary teaching candidates enroll for 30 months, or about four years, in a college or university to complete the first phase in a concurrent programme or the two phases in a consecutive programme, and they typically earn a Bachelor’s degree. In general, primary and middle grades preparation programmes differ significantly from secondary programmes. The latter emphasize coursework in the subject areas, on the subject’s teaching pedagogy (methods), and some additional education courses (for example, special education, social foundations of education, multicultural education). On the other hand, primary and middle grades programmes include pedagogy courses for language arts, social studies, and mathematics and science; other education courses; and fewer courses in the subjects than secondary programmes. Further, even within the same state, the structure of primary, middle grades, and secondary preparation programmes can vary based on state policies or individual institution decisions.

While the federal NCLB legislation mandates that teachers be ‘highly qualified’, it does not impose specific national curriculum requirements for teacher education; rather it allows the states (via the legislature, education agencies, board of education, and professional standards board) to take responsibility for establishing content guidelines in teacher preparation. The result is wide variation; for instance, as of 2007-2008 in the 50 states, 39 required five to 18 weeks of student teaching; 38 states required candidates to pass tests of basic literacy and numeracy; 41 states mandated that candidates pass tests of content knowledge; and three states did not require candidates to pass either type of test.

Current education reforms have been gradually taking control away from teacher education institutions toward the state and federal levels; this shift has particularly affected teacher certification policy while the structure of programmes and requirements for accreditation continue to vary within and across states.

Approach to Teacher Education

The extent to which research contributes to teacher education in the US varies by state, institution and programme. For instance, the nationally acclaimed teacher education programme at Michigan State University (MSU) was the result of the re-design of its programme to last five years, in order to include an internship year and increase its selectivity standards, after extensive national research on different approaches

to learning to teach in projects funded by the US Department of Education (for example, NCRTE/NCRTL) during the 1990s (see Feiman-Nemser, 2001; Kennedy, 1999). Other teacher education programmes across the country were part of the Holmes Group, no longer active, which in the late 1980s and early 1990s redesigned programmes according to the medical model in order to partner with schools known as professional development schools (PDS), as an integral part of the education of future teachers. Meanwhile, drastic changes in recruiting, educating and inducting teachers is rapidly coming from outside teacher education institutions, with little to no evidence of proven success, such as the introduction of new routes, such as Teach for America, and the increasing introduction of instructional technology. Overall there has been little research on the effectiveness or outcomes of university-based teacher preparation, or of the newer routes. Some exceptions include the TEDS-M Study in which the US participated (see Tatro et al., 2012 for the cross-country report) and the Teacher Pathway Project.

As concerns future teachers, while 'learning to reflect on practice' is generally recognized as important in teacher education programmes in research universities, its emphasis within programmes varies. The extent to which future teachers engage in research-related activities during their training varies also. In the past in the US, many teachers were trained at large teaching institutions (for example, Eastern Michigan, San Jose State) that placed less emphasis on research than places like MSU. This may be changing as programmes recognize the importance of inquiry in learning to teach, and with the growth of alternative teacher certification programmes with an emphasis on connecting theory and practice.

According to Grossman et al (2008), there are no national requirements concerning practicum and field experiences or the level of programme oversight on the selection of the cooperating teacher, cooperating teacher experience requirements, stability of cooperating teachers' participation, contact between programme faculty and field supervisors, number of required supervisory observations, explicit links between coursework and field experience, and/or number of courses that have required field experiences.

Vision of Future Teachers

Entry to the profession depends on meeting the definition of 'highly qualified teacher' (HQT) set by the US Department of Education, which includes having a Bachelor's degree, full state certification or licensure, and proving that future teachers know each subject

they will teach; this relatively new HQT definition has effectively lowered the standards for becoming a teacher and has allowed many underprepared individuals (such as under TFA, see Heilig & Jez, 2010; and similar) to enter the profession. According to NCLB, states are required to report plans and progress publicly to insure that all teachers are highly qualified, and that all students have highly qualified teachers -- particularly minority and disadvantaged students.

In conclusion, in a country as diverse and decentralized as the US, it is difficult to make comprehensive statements. Concerning common innovations signaling successful trajectories, the US has introduced policy and education laws that have transformed the educational landscape, continues to centralize and revise standards and curriculum, and continues to develop student assessment and data systems. Contrary to the case in Finland or in Singapore, the US presents quite a mixed picture when it comes to building the instructional skills of teachers, and ensuring appropriate teacher remuneration and rewards. New laws and reforms are moving teacher education and teaching from a system that worked by devolving responsibility to teachers and allowing them instructional autonomy, to a centralized system requiring compliance to rigid standards and promoting scripted teaching. This deconstruction and reconstruction of the system signals important structure and resource changes and a concern for improving basic literacy and numeracy for large sectors of the widely diverse population. The introduction of rigid accountability measures across the system, and the influence of the market in education, currently challenges the regulatory role of the state and university-based teacher education. The introduction of self-study by the new accreditation agency CAEP, and the support of US federal agencies such as the National Science Foundation and other similar play an important role in advancing knowledge, and collecting empirical evidence to inform policy and practice. Important counter-currents also exist², some coming from partisan groups challenging ideas about teachers' knowledge base and the location and length of teacher education.

CHILE

Guiding Philosophy, Regulation and Selectivity

Teacher education in Chile focuses primarily on the preparation of generalist teachers for all subjects of the eight-year basic school cycle with few programmes offering a specialization, which adds three or four extra courses in the specific subject-matter. The Organic Law of Education (1990) defined teaching qualifications in terms of a Licentiate degree in Education and a Teaching

² These include Teach for America (TFA), and the relatively new self-appointed group called the National Council on Teacher Quality (NCTQ) [<http://www.nctq.org/about/>] which receives funding from among others the Gates Foundation, the Carnegie Foundation, the Walton Foundation and other similar groups and has undertaken to issue judgments on the value of teacher education programmes, ranking them based on evidence gathered using what has been determined to be a very questionable strategy. Its Board of Advisors includes Sir Michael Barber (Pearson International, formerly with McKinsey and Company), Wendy Kopp (founder of TFA), and similar others. See responses from the AACTE—The American Association of Colleges for Teacher Education—a national alliance of educator preparation programmes: <http://aacte.org/resources/nctq-usnwr-review/responses-to-2013-nctq-us-news-a-world-report-review.html> in reaction to these actions.

Entitlement (Título de Professor). Chile has a career-based system which leads automatically to official entry to the teaching profession after graduation from teacher education programmes. In Chile attraction to teaching is low; consequently, universities have few limits on the number or quality of students they can enroll. Entrants to primary and secondary programmes are required to have completed secondary education successfully. A major in the subject matter or in the pedagogy of the subject matter is not required for basic education, but is for secondary education.

Chilean teacher education has been highly unregulated, which has allowed since the mid-2000s for remarkable growth of programmes in private higher education institutions of dubious quality. The result has been low entry knowledge levels of future teachers, a curriculum emphasizing general rather than academic content knowledge for basic school teachers, uneven quality of teacher educators with little research production, and insufficient funding to provide adequate supervision during field experience. Several measures have been taken to improve teacher education quality, however. For instance, to curtail the growth of low quality private teacher education, accreditation was declared obligatory in the 2009 Education Law, and is slowly having an effect on those programmes which are not yet accredited. A series of policies proposed by the current government and now in the form of a law under discussion in Congress, adds new requirements expected to improve the quality of future teachers: minimum higher university entrance scores for teacher education applicants, obligatory participation in the INICIA Programme tests (Initial Diagnostic Pedagogic Evaluation for Future Teachers), new standards for graduating teachers, and rewards in money for new teachers who entered teacher education with high scores or got a high INICIA score (see Meckes et al, 2012; MINEDUC, 2012).

Locus of Control and Curricular Demand

According to Avalos-Bevan (2012), during the 1990s most of the teacher education in Chile was in universities that were traditionally publicly funded; recently, however, a growing number of private universities have started to provide teacher education. According to the TEDS-M study sampling information, when the study began in 2006, 16 public universities, 22 private universities and five professional institutes offered a teacher education programme for basic education teachers. Accreditation is a tool currently used by the state to regulate uncontrolled growth of private teacher education.

In most institutions, teacher education is offered as a concurrent programme-type, lasting from eight to ten semesters. The curriculum of teacher education includes subject-matter knowledge, pedagogy, general education and field experience, and a practicum. The

Licentiate, done before the teaching career (usually for secondary school teachers) and under a consecutive programme, requires a written thesis.

Approach to Teacher Education

The teacher education improvement project carried out from 1997 to 2007, informed by national and international research, has strengthened the curriculum and broadened the scope of field experiences in order to start earlier and end with an extended practicum in schools under supervision by university supervisors and classroom teachers (Avalos-Bevan, 2012). Nevertheless, research has shown that the curriculum is implemented unevenly in teacher education institutions, and these differences relate particularly to the weight given to school content knowledge, which is heavier in preparing secondary teachers and lighter in preparing basic school teachers -- who still have to learn all 11 subjects of the curriculum, a situation that continues untouched by the reforms (Avalos, 2004; Avalos-Bevan, 2012).

While teacher education programmes are expected to work with schools (the teacher education curriculum requires about 3,000 hours of field experience, and a semester-long or four-month practicum), in most institutions the practicum is seen as a separate requirement, and more the responsibility of the schools than of the teacher education programme. Lack of funding prevents supervision and a working relationship with schools, thus hard evidence of this component of teacher education is lacking.

Vision of Future Teachers

According to MINEDUC, it is desirable that those graduating from teacher education programmes at the basic education and secondary education levels be able to demonstrate the following capabilities: adequate, coherent and correct oral and written communication in both Spanish and a second language; continuous learning and self-actualization vis-à-vis the change process; creativity for solutions to problems and innovation; capacity for abstraction, analysis and synthesis; quantitative knowledge to read, analyze and interpret different types of data; use of instructional technology to access new knowledge; and ethical commitment to work, responsibility, perseverance and pro-activity.

In conclusion, in Chile important changes in the professionalization of teaching have occurred, a result of large international, regional and national studies and consultations with international and national experts and scholars (Cox, Meckes & Bascope, 2010). In terms of the common innovations that seem to mark successful practice, Chile continues to introduce policy and education laws, is revising standards and curriculum, is developing an elaborate system to assess student learning, and is working to improve its data system. However, there is much work to do to

build the instructional skills of teachers, and to ensure appropriate teacher remuneration and rewards. Chile's centralized system is moving toward the creation of standards for teachers, and is introducing structure and resource changes throughout the system, including teacher education. The strong presence of the market, however, challenges the regulatory role of the state and the effectiveness with which teacher education and the education system as a whole can improve education quality for the neediest sectors of the population. Knowledge produced through accreditation and quality assurance processes is for the most part developed at the Ministry of Education and independent research centers, and there is an important research effort toward developing value-added models at all levels.

CONCLUSION

The international literature reviewed for this paper indicates that education systems are moving toward establishing teaching as a profession, and much of the conditions mentioned in the introduction have been enacted (for example, over the past three decades many countries have moved teacher preparation to universities and instituted rigorous and extensive courses of academic and practical study, accountability according to standards, quality assurance including the introduction of knowledge assessments, and value-added evaluation models, etc.).

The four cases reviewed here seem to generally support this conclusion. Particularly in Finland and in Singapore, and consistent with the typology derived from Mourshed, Chijioke & Barber, (2010), research plays an important role in teacher education (and overall school improvement); in both countries, research in education is collaborative and reforms are informed by evidence of what works. In both countries, administrative and curricular centralization characterizes the system, but teachers and teacher educators are given responsibility to implement the curriculum, and allowed to use research to inform their practice and to design teaching accordingly. Professional teacher education plays an essential role in school and system performance, children and teachers continue to be at the center of education; and the university (via teacher education) and the schools (via collaborative research-oriented practice) are the producers and users of evidence-based change. Evidence-based capacity building for individual and institutional improvement is present in both systems.

In contrast, in the US the situation is more mixed. Some future teachers and faculty engage in research, and there are accreditation procedures as opportunities for self-study and programme improvement. In some other programmes, the notion of accountability is taking on a retributive rather than restorative (or capacity building) orientation. Under 'No Child Left Behind', schools and teachers continue to be subjected to high stakes testing, with those who fail being at risk of losing their schools

(schools are closed or taken over by businesses, teachers are fired, and children are paradoxically left behind). Teacher education programmes are similarly affected by the growing culture of accountability, and by recent attacks to the profession. Regarding evidence-based teacher education, two developments seem particularly worrisome: the lack of accountability mechanisms to examine non-university-based alternative routes to becoming a teacher; and the development of the NCTQ, a business funded organization claiming to provide evidence for teacher education policy. The emergence of the latter signals a worrisome trend by a group of individuals attempting to persuade the public of 'the low quality' of teacher education with faulty evidence, but also taints with these actions the use of actual legitimate, rigorous, valid and reliable research methods to inform educational policy. Importantly, the US still has an extensive and well-funded federal programme to produce high quality research to inform policy and practice.

In Chile, a new evidence-based system to improve quality, research capacity and innovation is under implementation, undertaken by the central Ministry of Education in collaboration with research and professional institutions. Within teacher education, there is no evidence that faculty and future teachers engage in research (in 2008 a thesis requirement for graduation in pedagogical studies existed in some institutions; however, no mention of a thesis exists in the changes implemented since 2012). Similarly, quality assurance procedures and accreditation come from outside the institutions (from the Ministry of Education), and teacher education institutions are not involved in self-study. The market dominates in the system with more education institutions at all levels in private hands and outside of the state's regulatory control.

As reflected in these four countries, it is generally accepted that teacher quality requires high levels of academic and practical preparation, and currently this preparation mostly now occurs in universities with a period of practice in schools. While this model has resulted in the production of excellent teachers, there are also mixed results. Other models have entered the area with little evidence of success in spite of a considerable body of national and international research over the past 30 to 40 years that has guided and continues to guide university-based teacher education, establishing that there is a 'knowledge base for teaching' which is theory and practice based (for example, Shulman, 1986). While teacher education programmes continue to produce high quality teachers, the quality of these programmes is threatened not only by the market but also by the introduction of untested, yet well marketed, innovations (such as TFA). This is in contrast with medicine, nursing and law, where innovations are only implemented with the backup of rigorous and systemic research studies on their effectiveness.

More generally the field is vulnerable to non-evidence-based critiques and untested proposals for radical change. Disenchanted policy-makers and scholars blame teacher education for low pupil performance in international tests, which is increasingly attributed to poor teacher quality (yet close examination of Exhibit 1 reveals that Finland and US performance is very close in TIMSS and PIRLS, the assessments that are most reflective of the actual school curriculum). This has resulted in current reforms that question higher education-based teacher education and propose a drastic shift toward untested models of apprenticeships and similar other modalities that may significantly decrease the role of universities in educating future teachers.

This literature and country review shows that countries that consistently come out on top develop capacity from the bottom up, and rely heavily on methodologically rigorous research-based knowledge to inform their practice. As knowledge and societies change, more (not less) collaborative and rigorous research will be needed to investigate systematically best practices.

Note: This paper draws on existing reviews of research, research articles published in peer-reviewed journals, data collected by the TEDS-M study, and agency reports summarizing information of interest to the study.



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EXHIBIT 1 DEMOGRAPHICS

DEMOGRAPHICS	FINLAND	SINGAPORE*	USA*	CHILE
Summary	A republic in Western Europe with 19 administrative regions. Dominated by Sweden from the 12th to 19th Centuries and later by Russia; obtained independence in 1917. Member of the EU (1995), has a democratic and representative government. Successfully moved from a farm/forest economy to a highly industrialized, free-market economy.	Founded as a British colony in 1819. It joined the Malaysian Federation in 1963 and in 1965 became independent. The Republic of Singapore has 5,460,302 inhabitants and a parliamentary government; it is seen as having a highly developed and successful free-market economy.	The US is a federal republic with a democratic government; it gained its independence from Britain in 1776 and was recognized as a new nation in 1783. There are 316,668,567 inhabitants distributed across 50 states and 1 district. The US has a market-oriented economy, dominated by private individuals and business firms.	South American republic with a democratic and representative government and 15 administrative regions. A former colony of Spain, gaining independence in 1810. Dictatorial government for close to 20 years from 1973-1990. Currently Chile has a market oriented economy supported by a high level of foreign trade and a sound financial reputation.
Population	5,266,114	5,460,302	316,668,567	17,216,945
Population below poverty line	0%	0%	15.1%	15.1%
Population groups	Finn 93.4%, Swede 5.6%, Russian 0.5%, Estonian 0.3%, Roma (Gypsy) 0.1%, Sami 0.1%	Chinese 76.8%, Malay 13.9%, Indian 7.9%, other 1.4%	White 79.96%, black 12.85%, Asian 4.43%, Amerindian and Alaska native 0.97%, native Hawaiian and other Pacific islander 0.18%, two or more races 1.61% (15.1% of the total US population is Hispanic)	White and white-Amerindian 95.4%; Mapuche 4%, other indigenous groups 0.6%
GDP per capita (ppp)	36,500	60,900	49,800	18,400
Gini index	26.8	47.8	45	52.1
Educat. Expenditure (% of GDP)	6.8	3.3	5.4	4.2
Scores in TIMSS & PIRLS & TEDS-M	TIMSS 2011 Math Grade 4= 545; Grade 8=514; Science grade 4=570; grade 8=552. PIRLS Grade 4=568 TEDS-M: n.a.	TIMSS 2011 Math Grade 4=606; Grade 8=611; Science grade 4=583; grade 8=590. PIRLS Grade 4=567. TEDS-M mathematics knowledge: Primary 586/600; Secondary 544/587 TEDS-M Mathematics pedagogy knowledge: Primary 588/604; Secondary 539/562	TIMSS 2011 Math Grade 4=541; grade 8=509; Science grade 4=544; grade 8=525. PIRLS Grade 4=556. TEDS-M mathematics knowledge: Primary 518/520; Secondary 468/553 TEDS-M Mathematics pedagogy knowledge: Primary 544/545; Secondary 471/542	TIMSS & PIRLS n.a. TEDS-M mathematics knowledge: Primary 413; Secondary 354 TEDS-M Mathematics pedagogy knowledge: Primary 425; Secondary 394
Scores in PISA	PISA 2009 Reading=536; Math=541; Science=554	PISA 2009 Reading=526; Math=562; Science=542	PISA 2009 Reading=500; Math=487; Science=502.	PISA 2009 Reading=449; Math=421; Science=447
Accreditation / quality assurance of teacher education	In Finland only universities (faculties of education/ departments of teacher education) are allowed to organize teacher education and to give license to teach in schools. The Finnish Higher Education Evaluation Council (FINHEEC) conducts audits of the quality systems of higher education institutions (HEIs) including teacher education institutions, based on internal evaluations conducted by institutions.	Under the National Institute of Education and the Ministry of Education and strong feedback systems are in place regarding programme quality. International experts are employed regularly to provide independent evaluations in specialist fields.	External agencies responsible for the accreditation of teacher education institutions (NCATE and TEAC, now CAEP). CAEP's vision is to "develop and implement an agenda for research and innovation to foster continuous improvement in educator preparation."	As of 2008 Chile had an unregulated teacher education systems or voluntary accreditation only.

* Singapore and the US have two scores in the TEDS-M tests for primary and secondary levels. That is because they have two types of programmes to prepare primary and secondary future teachers; in all cases the second score belongs to programmes that prepare specialists or emphasize mathematics content (see Tatto et al., 2012).

EXHIBIT 2 COMMON SET OF INTERVENTIONS AND INTERACTION WITH THE STATE¹

Countries/ McKinsey study ratings	Six common interventions marking performance stage for education systems						How Implemented ²		
	Introducing policy and education laws	Revising standards / curriculum	Building instructional skills of teachers	Ensuring appropriate teacher remuneration and rewards	Assessing student learning	Improving data systems	Centralization/ rigid standards / scripted instruction	appropriate and rewards	Decentralized responsibility/ Flexibility / instructional autonomy
Finland/ Excellent	✓	✓	✓	✓	✓ (high stakes minimal)	✓		✓	✓
Singapore/ Great	✓	✓	✓	✓	✓	✓	✓	✓	
USA/ Good	✓	✓	- / +	- / +	✓	✓	✓	✓	✓
Chile/ Fair	✓	✓	-	✓ (developing)	✓	✓ (developing)	✓		

¹ Analysis done using categories proposed by Mourshed, Chijioke & Barber (2010).

² All countries have attended to (a) structure change - establishing new institutions or school types, altering school years and levels, or decentralizing system responsibilities; and (b) resource change - adding more education staff to schools or increasing system funding. There is less attention to processes change - modifying curriculum and improving the way that teachers instruct and principal's lead- in the USA and in Chile.

EXHIBIT 3 UNIQUE SET OF INTERVENTIONS AND INTERACTION WITH THE STATE¹

Excellent

(shaping the teaching profession such that its requirements, practices and career paths are as clearly defined as those in the established professions; inquiry-oriented teacher education; emphasis on curriculum and process of instruction; learning through peers and innovation)

<p>The state exerts centralized control, externally driven accountability predominates, and market forces are ubiquitous</p>	<ul style="list-style-type: none"> ▪ Finland (excellent) ▪ Singapore (great) The state has a regulatory and mediating role, internal accountability prevails, and market forces are not allowed to operate
<ul style="list-style-type: none"> ▪ Chile (fair) 	<ul style="list-style-type: none"> ▪ USA (good)

Fair

(establishing the foundations of data gathering, organization, finances, and pedagogy; emphasis on structure and resources rather than process, focus on achieving basic literacy and numeracy; scripted curriculum; low quality unregulated teacher education)

¹ Analysis done using categories proposed by Mourshed, Chijioke & Barber (2010).

EXHIBIT 4 INSTITUTIONAL REQUIREMENTS TO COMPLETE TEACHER EDUCATION*

Institutional Requirements <Future Teachers> Have To Meet To Successfully Complete their Teacher Education Programme Percentage of Institutions Answering “Yes” (rounded up)			
	Singapore	USA	Chile
Receive a passing grade on all the <courses/subjects/units> required by the programme	100 (n=10)	100 (n=115)	100 (n=38)
Pass a comprehensive written examination /assessment	0 (n=10)	38 (n=115)	28 (n=38)
Pass a comprehensive oral examination /assessment	0 (n=10)	11 (n=115)	46 (n=38)
Pass an examination set by national or state/provincial authorities	0 (n=10)	83 (n=115)	7 (n=38)
Pass an examination set by this institution or programme	0 (n=10)	32 (n=115)	32 (n=38)
Successfully demonstrate a required level of teaching competence in a classroom	100 (n=10)	100 (n=115)	69 (n=38)
Receive passing grade on field experience	100 (n=10)	99 (n=115)	100 (n=38)
Write and defend a thesis	0 (n=10)	7 (n=115)	82** (n=38)

* Finland did not participate in TEDS-M. According to data taken from the website describing teacher education in the University of Helsinki, under the assumption that there is a high degree of equivalence across universities in key requirements, the following are requirements to receive a qualification: receive a passing grade on all the <courses/subjects/units> required by the programme; receive passing grade on the field experience; and write and defend a thesis. Lacking in the website was information on the following aspects: whether or not prospective teachers are asked to pass a comprehensive written examination /assessment; pass a comprehensive oral examination /assessment; pass an examination set by national or state/provincial authorities; pass an examination set by this institution or programme; or, although they have an extensive practicum there is not an explicit requirement to successfully demonstrate a required level of teaching competence in a classroom.

** From TEDS-M 2008 data. However writing and defending a thesis currently does not seem to exist after the study programmes were revised in 2012. See as an example Pontificia Universidad Catolica de Chile <http://dsrd.uc.cl/indice-de-carreras-y-postgrados/educacion-de-parvulos-pedagogia-general-basica-y-programa-de-formacion-pedagogica>; and Universidad de Chile <http://www.uchile.cl/carreras/5009/profesor-de-educacion-media-en-asignaturas-cientifico-humanistas>.

EXHIBIT 5 PRACTICUM ACTIVITIES IN TEACHER EDUCATION

Percentage Of Institutions Reporting That Their Future Primary and Secondary Teachers Do The Indicated Activities During The Practicum						
	Institutions Preparing Primary Teachers ¹			Institutions Preparing Secondary Teachers ²		
	Singapore	USA	Chile	Singapore	USA	Chile
Observe a teacher /supervisor /mentor/teacher	100	73	88	100	61	90
Serve as a teacher aide in non-host classroom	0	12	43	0	13	43
Design instruction / lesson plans in mathematics	100	44	38	100	38	38
a) separately	100	24	20	100	28	20
b) jointly with host teacher	100	23	3	100	36	3
Design instruction/lesson plans other than mathematics	100	55	88	100	20	88
Deliver mathematics instruction	100	45	13	100	45	13
a) jointly with mentor/host teacher	0	18	3	0	22	3
b) observed (by educator/mentor) while teaching	100	35	5	100	38	5
c) teaching without observation	100	12	10	100	9	10
Deliver instruction other than mathematics	100	55	78	100	22	78
Supervise non-mathematics instruction	100	25	5	100	13	5
Assess students (full responsibility)	100	39	63	100	33	63
Supervise or organize social activities	0	10	10	0	14	10
Work with parents	0	32	43	0	36	43
Participate in formal school meetings of teachers	100	29	18	100	33	18
Participate in school level administration and/or counseling	100	4	13	100	1	13
Design and carry out an action research project	0	18	13	0	14	13
Discuss practicum experience with peers	100	40	63	100	37	63
Write report of observing and/or teaching experiences	100	58	80	100	53	80
Meet at institution with supervisor to discuss practicum	100	60	25	100	55	25
Attend professional conferences	0	14	3	0	14	3
	n=6	n=84	n=40	n=2	n=76	n=40

Source: TEDSM 2008 Curriculum and Syllabi Analysis Study. Finland did not participate in TEDS-M. According to data taken from the University of Helsinki website, the activities during the practicum for prospective teachers in the programme are: observe a teacher /supervisor /mentor/host teacher; design instruction / lesson plans in Mathematics; design instruction/lesson plans other than Mathematics (primary only); deliver Mathematics instruction; deliver instruction other than Mathematics (primary only); design and carry out an action research project; and write report of observing and/or teaching experiences.

1 Chile: Generalist Teachers (grade 1 to 8): 8 semesters and 3,200 hours in classrooms. Singapore: Primary Generalists grade 6 maximum: BA(Ed) (Pri), 4 years; BSc(Ed) (Pri), 4 years; Dip Ed, Primary Option C, 2 years (consecutive); PGDE(P) Option C, 1 year (consecutive); and Primary mathematics specialists: Dip Ed, Primary Option A, 2 years; PGDE(P) Option A, 1 year. USA: Primary Generalists grade 6 maximum: Primary Teacher Education (concurrent); Primary Teacher Education (consecutive); and Primary mathematics specialists: Primary and Secondary Teacher Ed. Concurrent; Primary and Secondary Teacher Ed. Consecutive. All 4 to 5 years.

2 Chile: Lower Secondary Mathematics (to Grade 10 Maximum): Generalists Teachers (grade 1 to 8); and Generalist Teachers + mathematics (grade 5 to 8). Singapore: Lower Secondary Mathematics (to Grade 10 Maximum): PGDE(Lower Secondary), 1 year, Jan 2007 intake; PGDE(Lower Secondary), 1 year, July 2007 intake; and Lower Secondary Mathematics (to Grade 11 and above): PGDE(Secondary), 1 year, Jan 2007 intake; PGDE(Secondary), 1 year, July 2007 intake. USA: Lower Secondary Mathematics (to Grade 10): Primary and Secondary Teacher (concurrent); Primary and Secondary Teacher (consecutive); and Lower Secondary Mathematics (to Grade 11 and above): Secondary Teacher (concurrent); Secondary Teacher (consecutive). All 4-5 years.

EXHIBIT 6 TYPOLOGY OF TEACHER EDUCATION IN THE FOUR COUNTRIES

	Typology of Teacher Education in the Four Countries				
Countries	Guiding Philosophy, Regulation, and Selectivity	Clear locus on control (centered in universities) and a coherent curriculum with high cognitive demand	Approach to Teacher Education	Outcome: Vision of the teacher	Research Role (inquiry oriented learning)
Finland (Excellent)	Development of the professional teacher High levels of regulation Highly selective	Universities Coherent curriculum Very high cognitive demand	Inquiry oriented Strong connections between theory and practice Mutually reinforcing university-school partnerships	Responsible, competent, autonomous, professionals with problem solving capacity able to create evidence-based instructional innovations	Research informs policy and practice in teacher education (shapes curriculum, requirements, and quality assurance mechanisms)
Singapore/ (Great)	Development of the professional teacher Central control Selective	National Institute of Education Coherent curriculum High cognitive demand	School curriculum knowledge oriented Strong connections with practice Mutually reinforcing university-school partnerships	Responsible, competent creative teachers able to implement an inquiry-based curriculum and the national vision for Singapore schools	Research informs policy and practice in teacher education (shapes curriculum, requirements, quality assurance mechanisms)
USA (Good)	Highly qualified status / Development of the professional teacher High levels of regulation Low selectivity	Universities and private routes Incoherent curriculum Low cognitive demand	School curriculum knowledge oriented/ Inquiry oriented Strong / weak connections between theory and practice Mutually reinforcing university-school partnerships/ Low functioning university-school partnerships	A "highly qualified teacher" (HQT) with a bachelor's degree, full state certification or licensure, and proof that they know each subject they teach.	Research has a mixed influence in informing policy and practice in teacher education. The influence of research knowledge is limited by ideology and tradition.
Chile/ (Fair)	Development of a knowledgeable teacher Low levels of regulation Low selectivity	Universities and private routes Incoherent curriculum Low cognitive demand	Inquiry oriented Strong connections between theory and practice Low functioning university-school partnerships	An individual with correct oral and written communication in both Spanish and a second language; continuous learning; creativity for solutions to problems and innovation; capacity for abstraction, analysis, and synthesis; quantitative knowledge to interpret different types of data; use of instructional technology; and ethical commitment to work, responsibility, perseverance, and pro-activity	Research has had limited influence on policy and practice in teacher education The influence of research knowledge is limited by ideology and tradition.

APPENDIX 1: KEY ASPECTS OF EDUCATION SYSTEMS IN THE FOUR COUNTRIES

FINLAND

Structure

There is one year of non-compulsory preschool. The basic compulsory educational system in Finland is the nine-year comprehensive school (Finnish *peruskoulu*, Swedish *grundskola*, 'basic school'), for which school attendance is mandatory. There are no 'gifted' programmes, and the more able children are expected to help those who are slower to catch on. Schools up to university level are almost exclusively funded and administered by municipalities of Finland (local government). There are few private schools as the use of tuition fees is strictly prohibited, and selective admission is prohibited as well. Teachers are fully unionized and follow state curriculum guidelines but are accorded a great deal of autonomy as to methods of instruction.

Significant Reforms

Three reforms are key to understanding Finland's system: its Comprehensive School Reform (1972–1977), which replaced the dual-track system with the nine-year, single, mixed-ability comprehensive school; Teacher Education Reform (1973–1979), which changed primary school teacher preparation, removing it from teacher-training colleges to university faculties of education, and raising it to the Master's degree level in 1979; General Syllabus and Degree Reform in Higher Education (1977–1980), which abolished the Bachelor's degree but reverted to it in 1994 through the Bologna Process (Simola, 2007, 1993; Webb, Vulliamya, Hämäläinenb, Sarjab, Kimonenb, & Nevalainenb 2004). Another reform created in 1971 Finland's national core curriculum, which still serves 'as a means for enabling and managing educational change' and has played an important development role in the Finnish school system (Vitikka, Krokfors, & Hurmerinta, 2011, p.1).

Main Quality Assurance Strategies

The national core curriculum is a 'framework for designing local curricula'; it contains 'objectives and core content for teaching all school subjects, describes the mission, values, and structure of education, and presents the conception of learning, school culture, and working methods' (Vitikka, Krokfors, & Hurmerinta, 2011, p.1). The core curriculum which was created through a 'process of collaboration between national and local authorities' continues to de facto regulate teaching and learning in classrooms, and in teacher education in what the authors qualify as a 'highly developed practice' focused on curricular structure and pedagogical functionality (Vitikka, Krokfors, & Hurmerinta, 2011, p.2). Since its insertion the core curriculum was implemented with only minor modifications in schools and districts;

and meant that everything, from teacher education to learning materials in schools could be well integrated; indeed until the early part of the 1990s there were inspections of schools and books (Scheinin, 2009). While the later reform gave wider license to the schools and communities, the well-integrated and highly coherent educational system with a majority of modern teachers in the schools had already been built. In contrast to other systems where tests and standards dominate, in Finland the first high stake tests take place at the end of upper secondary (Grade 12) level, and no standards exist besides the core curriculum that teachers follow with a certain degree of autonomy and flexibility. Other explanations for Finland's success in TIMSS and PISA have been provided by scholars (Aho, Pitkanen, & Sahlberg, 2006; Hargreaves & Fink, 2006; Sahlberg, 2007). In particular, two key policy emphases seem to explain Finland's situation: 'conservation' (a balance between innovations and existing good practices; a realization that learning from past experiences is as important as introducing totally new ideas in schools), and 'resourcefulness' (systematic and research-based ways to prepare and continuously develop leaders and to maintain their knowledge and skills) (Sahlberg, 2007, pp. 166-167). Other important policies that Sahlberg (2007) argues are based on research insights include 'depth' (the holistic development of personality, knowledge, skills, values, creativity, and interpersonal characteristics); long-term vision and strategic principles of justice (equal opportunities to quality education from maintaining a socially just school network of uniformly excellent schools); 'breadth' (with education leadership gradually diffused from the center to local levels); and 'diversity' (the idea of inclusive education that promotes diversity in schools and classrooms, and which results on guidelines encouraging creative solutions within increasingly diverse social and human environments) (pp. 166-167).

Overall System Performance

The changes introduced to the Finnish system resulted in the late 2000s in a remarkable level of achievement as measured by international testing systems such as TIMSS and PISA. Since then, many nations have looked to Finland for the source of this 'miracle.' Important is lateral capacity building as explained by Fullan (2005), and in addition to a highly coherent system, according to Finnish researchers, Finnish teaching is authoritarian, obedient, collectivist in mentality (an 'ethos of equality'), and conservative politically and pedagogically, requires hard work; and is considered a serious life commitment (Simola, 2007, p.457).

In Sum

According to Sahlberg (2007), enabling municipalities and schools to learn from each other and making best practices universal by adopting innovative approaches to

organizing schooling, encouraging teachers and schools to continue to expand their repertoires of teaching methods, and individualizing teaching to meet the needs of all students characterizes Finland's strategy for an excellent system (p.167).

SINGAPORE

Structure

Singapore offers two years preschool, and six years of compulsory primary school and five years of secondary school. In contrast with Finland, Singapore has programmes for gifted students and other programme varieties including an international baccalaureate.

Significant Reforms

The current success of Singapore's education system can be traced back to the 1986-1994 reform period, when the Ministry of Education designated a number of well-established secondary schools as 'independent and autonomous schools' and created in 1992 an accountability system to evaluate the schools (Tan & Gopinathan, 2000). The most recent curricular reforms began in 1997 with the 'Thinking Schools, Learning Nation' initiative, including explicit teaching of critical and creative thinking skills; reduction of subject content; revision of assessment modes; and greater emphasis on processes than on outcomes when appraising schools (Tan & Gopinathan, 2000, p.7). Two additional initiatives emphasized information technology in teaching and learning in all schools, and expansion in the criteria for university admission (Tan & Gopinathan, 2000, p.7-8).

Main Quality Assurance Strategies

Singapore has a mandatory national curriculum, and a strong accountability culture in schools, which includes "students' overall results in the annual General Certificate of Education (O/L) examinations, a school's value-added index (comparing students' examination performance with their examination scores upon entry), and a weighted index of school's performance in the National Physical Fitness Test" (Tan & Gopinathan, 2000, p.6). There are common national examinations at the end of the 6th, 10th, and 12th years of schooling. According to Tan & Gopinathan (2000), the system's ethos is based on central control, combined with a "quest for creativity and innovation marked by increased school autonomy and increased interschool competition" and school autonomy is expected to bring about "flexibility in recruitment, deployment and rewards of staff, finance, management, and the curriculum" (p. 6) within an accountability culture.

Overall System Performance

In explaining Singapore's high performance in international tests (TIMSS, PIRLS, PISA), Singapore's Ministry of Education (MOE) emphasizes its "broad-based and holistic learning approach to learning" and specifically their "bilingual policy ... focus on teacher

quality and integration of information, communication technologies (ICT) into learning, and [...] schools close work with the parents and the community" (MOE, 2012a, p. 2). The primary school curriculum emphasizes English Language, Mathematics, and Mother Tongue Language, complemented by Art, Civics, Moral Education, Music, Social Studies and Physical Education. Science is introduced in primary grade 3. According to the MOE, "At the end of Primary 6, all students are assessed on their academic abilities via the Primary School Leaving Examination (PSLE), and placed in an Express, Normal (Academic) or Normal (Technical) secondary school course according to their academic learning pace and aptitude" (MOE, 2012a, p. 4). Strongly influenced by the British system, there are many tests ('Singapore/Cambridge' Testing System) at the end of the secondary tracks in several subjects, depending on academic ability (for example, six to eight or nine subjects in the Singapore-Cambridge GCE O or N) (MOE, 2012a, p. 4-6). Test results are used to fine-tune the system and the curriculum.

In Sum

According to the Minister of Education, "Singapore made significant progress in leveling up the academic performance of its academically-weaker students [...] students' reasoning ability [...] has improved, reflecting the impact of the shift in our curriculum towards more inquiry-based teaching and learning in schools over the years" (MOE, 2012b, p.1-2).

USA

Structure

Most children enter the public education system around age five or six. They may begin in preschool, kindergarten or first grade. They normally attend 12 grades of study over 12 calendar years of primary and secondary education before graduating, earning a diploma that makes them eligible for admission to higher education. Education is mandatory until age 16. There are generally five years of primary (elementary) school, during which students customarily advance together from one grade to the next as a single cohort or 'class', three years of middle school, which may have cohorts, and four years of high school. There is some variability in the arrangement of grades.

Significant Reforms

The 1983 Report 'A Nation at Risk' started an important time for education reform in the US, but it was not until 2001, with the No Child Left Behind Act (NCLB), that education in the US changed dramatically. NCLB is an act of Congress which reauthorized the Elementary and Secondary Education Act of 1965 and supports standards-based education reform and measurable goals to improve individual outcomes in education. In 2009 the US Department of Education created the 'Race to the Top Program' (RTTP), a \$4.35 billion

contest inducing states to implement 'looked-for' reforms, including performance-based standards for teachers and principals, nationwide curriculum standards including teacher education, strategies to improve low achieving schools (for example, via charter schools and/or privatization), and assessments and data systems to regulate instruction and track progress (Youngs & Grogan, 2012). The RTTP reforms are different from NCLB and the states could apply for a waiver from the NCLB requirements if they agree to implement the RTTP reforms (i.e., Common Core standards and assessments, teacher evaluation reforms, among others).

Main Quality Assurance Strategies

To receive federal funding, the act requires states to develop and administer annual standardized testing, to report academic yearly progress (AYP), to participate in school report cards, and to prepare and hire highly qualified teachers

As a result of these policies, public schools find themselves competing for students against charter and private schools; and teaching, especially in poor areas, is more scripted because teachers are pressured to 'teach to the test' to meet AYP. Schools' failure to demonstrate AYP for two consecutive years initiates corrective actions that may end in school restructuring, closings, or take-over by private managers (Dillon & Rotherham, 2007). According to Meier & Wood (2004), the incentives and penalties set up a strong motivation for schools, districts, and states to manipulate test results.

Overall System Performance

In explaining the US's uneven performance in international tests, while in some areas student achievement seems to be improving, the US is still failing to educate a large number of students, leaving them unprepared to compete in the global economy (Klein, Rice, & Levy, 2012). This conclusion agrees with other researchers (for example, Hanushek, Peterson and Woessmann, 2012) who reported a large percentage of students under-performing in high school and middle school mathematics in international tests, 'placing the US 32nd' in international rankings (p.1). There is also recognition that improvements have been made among elementary school students who 'seem to be performing considerably better than they were a couple of decades ago' (p.2), an accomplishment that researchers attribute to increasing expenditures per pupil by 1/3, and to the development of accountability policies at the state and federal levels. More needs to be accomplished, thus two recent initiatives are expected to improve quality, the 2009 RTT Programme described above, and the 2013-2014 implementation of national standards, such as the Common Core Standards (educational standards shared by all but five US states) that 'set national expectations for student achievement in math and reading' (Klein, Rice, & Levy, 2012, pp. x, xi). More than 40 states plan

to implement the Common Core assessments in 2014-15. Federally funded research programmes through the Institute of Educational Sciences (US Department of Education) and the National Science Foundation are evaluating the success of these policies.

In Sum

While NCLB was originally intended for the most disadvantaged students, paradoxically those students are most at risk of having their schools closed, because teachers lack the support needed for teaching the curriculum that would allow their students to be more successful in the tests. There is ongoing discussion on what the goals of education should be, and whether achieving desired test results will improve the situation.

CHILE

Structure

The structure of the education system in Chile comprises municipal, private subsidized and all-private schools. Competition occurs at the level of the publicly funded system between municipal and private subsidized schools (which together cover above 90% of the school population with the private subsidized schools — equivalent to the academies in England and the charter schools in the US -- covering 53%). The apparent better quality of the private subsidized (if no correction for the socioeconomic status of the pupils is made) disadvantages the municipal system (Matear, 2007).

Significant Reforms

The system has been shaped by several waves of reform beginning with the 1965 reform which established basic education as mandatory and changed the structure of the education system from six to eight grades, with secondary education lasting four years, with three tracks in the last two years; this 1965 reform has now been superseded by the new 2009 General Education Law, which is due to be implemented in 2018 and will establish basic education to last six years, and secondary education to last six years, with four years for general education and two for different disciplines (MINEDUC, 2012, p. 9). The 1980s reform introduced the school voucher system and contributed to the stratification of the publicly funded education system (municipal schools--with the more vulnerable student populations--and public subsidized schools which may charge fees). This pro-market reform which brought about administrative decentralization, capitation-based financing, labor deregulation, and open competition between public and subsidized private schools, was launched during Chile's military government, which also closed the normal schools for teachers. The 1990s 'change' reforms brought about school autonomy, flexible curriculum, student assessment, attention to classroom processes, and improvement in teachers' professional development, and was instituted by the first governments of the democratic transition, which

sought to reorient public investment toward quality and equity while maintaining previous administrative and funding frameworks, and was followed by the 1996 Full School Day (FSD) reform (Delannoy, 2000; Nuñez, 2002). Additional reforms have been enacted to improve teaching quality, specifically the 'Docente Mas,' a teacher evaluation system based on the 2003 document 'Marco para la Buena Enseñanza' (Law 19.961, MINEDUC, 2004). Yet this teacher performance system is partial because it only affects teachers in municipal schools and not those in private subsidized schools. A 2003 law introduced a teacher evaluation system, which requires teachers to prepare a portfolio (evidence of performance including elaboration, implementation, evaluation, and reflection on lesson plans and a recorded class session of 40 minutes, reviewed by peers with at least four years of experience at the level at which the teacher is evaluated), which has a weight of 60%; to write a self-evaluation (10%); and to undergo an evaluation by peers (20%) and by the principal (10%). Teachers may receive one of four ratings: unsatisfactory, basic, competent -- the minimum expected, and outstanding. Teachers who receive a 'non-satisfactory' evaluation in three consecutive years (after support and mentoring, including one year off for professional development) are out of the teaching profession. Currently there is a new law on teacher career incentives under discussion in Congress which may consider among other things salary increases depending on certificate and specialization.

Main Quality Assurance Strategies

Chile's Ministry of Education (MINEDUC) currently manages a comprehensive accountability system, SIMCE (System for Measuring the Quality of Education), a standardized set of school examinations put in place in the eighties by the military government, with the goal of developing information systems for improved school performance. The SIMCE examination school result is a factor considered for incentive programmes as well as for the current Preferential School Subsidy Programme which provides resources for improving the schools with poor achievement levels. Inequality is at the root of the Chilean education system and explains the differences in SIMCE results between the municipal (poorest schools) and the private subsidized (allowed to charge fees besides receiving public subsidies). The highly hierarchical system makes it difficult to build democratic school leadership and collaborative quality assurance according to Delannoy (2000) who argues that parents, while having a 'choice,' have typically lacked 'voice' in schools. School choice policies have resulted in more inequality; upper and middle class students select private schools, and poorer students remain in less resourced schools.

Overall System Performance

In explaining Chile's performance on the PISA test,

scholars point to reforms that since 1981 have resulted in a more 'comprehensive school choice system than any other country in the world' (Elaqua, Contreras, Salazar, & Santos, 2008, p. 62), and to the 1988 introduction of the System for Measuring the Quality of Education (SIMCE), a standardized national assessment of student performance for 4th, 8th and 10th graders in language, mathematics, and environmental, cultural, and social themes. Since 1995, SIMCE results have been used in school performance evaluations, which are made public. In 1996, the National System for Assessing Teachers' School Performance was introduced. This system rewards good SIMCE school performance and provides monetary incentives to the schools, which in turn are distributed among the teachers. The success of these reforms according to research is mixed. Araujo (2009) showed that "reading, mathematics and scientific literacy measured by PISA-2006 assessments were positively related with attendance at schools which received SNED awards (Sistema Nacional de Evaluación del Desempeño de los Establecimientos Educacionales / System of School Performance Assessment), after controlling for individual socio-economic factors as well as school-quality factors; [these schools] not only offered higher education quality compared to their peers in terms of national curriculum coverage, but they also contributed to develop higher competences relevant to future personal, social, and economic well-being among their students" (p. iii). Other scholars share this view, indicating that while all OECD Latin American countries participating in PISA scored lower than the other countries, Chile scored higher than any other Latin American country in reading and in mathematics (OECD, 2007). However the research on the positive effects of SNED is challenged by others, Mizala & Torche (2012) have shown in an authoritative study that there is a strong pattern of "socioeconomic segregation across private-voucher schools and influence of school-level SES on students' test scores"... they explain, "school-level characteristics such as school size, teachers' experience, rurality, religious schools, or parental add-on fees have a small influence on achievement after accounting for the socioeconomic composition of the student body, and they play almost no role in accounting for the influence of aggregate school-level SES on students' test scores" (Mizala & Torche, 2012, p. 142).

In Sum

In sum and according to Chilean scholar Avalos, "Despite actions directed to improving the quality of teaching in Chile, national and international assessments show that student learning is not as good as expected. While it is recognized that poverty and cultural background play an important role in these results there is concern about the little effect that reforms seem to have had on teaching and learning, especially in schools attended by lower income groups" (Avalos, 2005).

This paper has been commissioned as part of a major Inquiry undertaken by BERA and the RSA on the role of research and teacher education. The Inquiry aims to shape debate, inform policy and influence practice by investigating the contribution of research in teacher education and examining the potential benefits of research-based skills and knowledge for improving school performance and student outcomes.

To investigate the contribution that research can make to teacher education, seven academic papers have been commissioned from experts in the relevant fields: international and UK policy and practice on teacher education; philosophical reflections on the nature of teachers' professional learning; innovative programmes of initial teacher education based on the model of research-informed 'clinical practice'; the role of research in effective continuing professional development (CPD); the impact of research-based teaching on school improvement and student outcomes; and research engagement from the teacher's perspective.

Further information on the Inquiry and its other outputs can be found via the BERA website: www.bera.ac.uk