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Are Teachers Crucial for Academic Achievement? Finland Educational Success in a Comparative Perspective

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Abstract: Teachers are seen as the main reason behind the high, equal, and consistent student performance in Finland as measured by the Programme for International Student Assessment (PISA), and there is a lot of truth in this. Candidates for teacher training programs are selected through a rigorous process, for example. However, using primarily the case of Finland, this paper seeks to show that factors beyond the quality of teachers are also involved in explaining high performance on international standardized tests by students around the world. The policy of attracting high-caliber students and providing high-quality preservice training, suggested by organizations such as the Organisation for Economic Cooperation and Development (OECD) and McKinsey & Company, does not necessarily seem to be related to high student performance in all countries.
Keywords: Finland education; preservice teacher education; teacher education; comparative education and policy; teacher quality; student success

¿Son los Docentes Cruciales para el Logro Académico? El Exito Educativo de Finlandia en una Perspectiva Comparada
Resumen: Los maestros son vistos como la principal razón detrás del alto, equitativo y consistente rendimiento de los estudiante finlandeses, según la prueba del Programa para la

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Evaluación Internacional de Alumnos (PISA). Hay mucho de verdad en esto. Los candidatos a los programas de formación de profesores en Finlandia son seleccionados mediante un proceso riguroso. Sin embargo, utilizando principalmente el caso de Finlandia, este artículo pretende demostrar que factores más allá de la calidad de los maestros parecen estar involucrados en el alto rendimiento de los estudiantes de todo el mundo en las pruebas estandarizadas internacionales. La política de atracción de estudiantes de alto nivel y la formación inicial de alta calidad, sugeridas por organizaciones como la Organización para la Cooperación y Desarrollo Económicos (OCDE) y McKinsey & Company, no parecen necesariamente estar relacionadas con el alto rendimiento de los estudiantes en todos los países.
Palabras-clave: educación finlandesa; formación inicial de maestros; formación docente; política y educación comparadas; calidad de los maestros; éxito de los estudiantes

São os Docentes Cruciais para o Desempenho Acadêmico? O Sucesso Educativo da Finlândia em Perspectiva Comparada

Resumo: Os professores são vistos como a principal razão por trás do desempenho alto, justo e coerente de estudante finlandês como prova do Programa Internacional de Avaliação de Alunos (PISA). Há muita verdade nisso. Os candidatos para programas de formação de professores na Finlândia são selecionados através de um rigoroso processo. No entanto, usando principalmente o caso da Finlândia, este artigo tem como objetivo demonstrar que os fatores além da qualidade dos professores parecem estar envolvidos no alto desempenho de alunos em todo o mundo em testes padronizados internacionais. A política de atração de estudantes de alto calibre e de formação inicial de alta qualidade, sugerido por organizações como a Organização para a Cooperação e Desenvolvimento Económico (OCDE) e McKinsey & Company, não necessariamente parecem estar relacionadas com o alto desempenho dos alunos em todos os países.
Palavras-chave: educação finlandesa; formação inicial de professores; formação de professores; política e educação comparada; a qualidade dos professores; o sucesso do aluno

Are Teachers That Important?

After the results from the first four rounds of PISA (2000, 2003, 2006, 2009) were published, Finland was viewed, within the realm of this specific standardized test, as a success story in education (Hargreaves, 2008; Hargreaves, Halász, & Pont, 2007; Julin, 2006; McKinsey & Company, 2007, 2010; OECD, 2008; Tryggvason, 2009). The issue is very important for policy making because PISA has become the guiding instrument of choice of many national governments for design and implementation of policy changes. The increasing number of countries and economies participating in PISA from 2000 to 2012 is evidence of the high relevance of the test to national educational authorities throughout the world. The numbers of countries participating in the first five rounds of PISA were 43, 41, 58, 74, 65, and 71 for 2015.[1]

If we set aside the many anecdotal explanations such as genes, free school lunches, no school uniforms, co-educational schools, and a refusal to dub foreign movies and TV programs, we find in the literature that the factors in Finland's success in student performance in international tests, may be clustered into five groups: (a) many factors intertwined, (b) culture, (c) equity, (d) the education system, and (e) teachers.

As seen later in the paper, researchers and policy makers have offered many explanations for Finnish success. Among all the explanations, teacher quality seems to be the most important one.

[1] http://www.oecd.org/pisa/aboutpisa/pisafaq.htm (December 29, 2014).

This paper questions the plausibility of the "teacher hypothesis" as the main factor behind student success. The consequences of the rejection of the teacher hypothesis are paramount for policy making. Teachers in Finland are indeed of high quality because of the very strict process of selection into the preservice teaching programs. In addition, there is a very highly qualified pool of applicants because high school students in Finland not only perform very high academically but also with very low variance of performance between schools. However, one of the main points of this paper is that the quality of teachers is not enough to explain high student performance. Furthermore, we will see cases where the quality of teachers, as later defined, is not high or very high and yet the performance of students is high or very high.

The paper is organized in four main sections: (1) a review of the literature on factors explaining the Finnish success in education with special emphasis on teachers, (2) a rethinking of the perspective on the high-caliber status of the teacher force in Finland, (3) some contrasting evidence about the relationship between the teacher quality and student performance, and (4) concluding remarks.

The review of the literature is constrained to the works related to Finnish school success and not to school success in general; this topic is vast and impossible to review, and it is beyond the scope of this paper. It is also constrained to the literature available mainly in English or Finnish with some translations into English, as pointed out in the paper. The Finnish education story is very recent, as the first results from PISA 2000 were only made public in 2001. For the entire decade, Finland became a fad and benchmark for school education given its remarkable results in the first four rounds of PISA. Since Finland is a small country with a very vernacular language, the literature at first was limited. This is why I decided to use as much as possible the sources of Finnish scholars and direct interviews with scholars, teachers, and principals for insight to Finnish success. Furthermore, before PISA very the little was known about Finland's school performance in comparative world education. Finland did not perform as highly on other international tests as it did on PISA.

Factors Related to Educational Achievement Success

Many factors intertwined. The experts have typically suggested that success is a combination of many factors (Aho, Pitkänen, & Sahlberg, 2006; Niemi, 2012; Pehkonen, 2008; Sahlberg, 2011) that are so "intertwined and twisted all together" that it is almost impossible to distinguish the most important one(s) (Linnakylä, 2008). There is considerable agreement that "there is, of course, no one secret or single key behind the high performance of Finnish students" (Linnakylä & Arffman, 2007, p. 8). In 2002 a group of researchers stated, "all in all, the results of PISA suggest that there is no single key factor behind Finland's successful performance in PISA" (Välijärvi, Linnakylä,, Kupari, Reinikainen, & Arffman, 2002, p. 46; Välijärvi et al., 2007, p. 52), and some years later the conclusion was the same: "There is, in fact, no one single explanation for the result" (Välijärvi et al., 2007, p. 3).

Finnish researchers have also outlined and described two less specific reasons behind Finland's success on PISA: (1) high quality and equality of educational outcomes and (2) educational environment (Välijärvi et al., 2007, pp. 38, 48). Even though many researchers have raised the relevance of this "ecological" view of education, complex models of statistical analysis have defined, in ranking order, the factor or set of factors that best explain the greatest variance in school, student, or system performance. However, comprehensive in data gathering and data analysis, these models have methodological limitations, especially when constructing contextual variables based on perceptions to link students' performance to teacher or school quality (OECD, 2007, pp. 215, 264).

Nevertheless, the same researchers and organizations that have accepted the complexity of the relationship, such as the OECD and McKinsey & Company, have also highlighted one or more factors as crucial for success (Pehkonen, 2008). When these factors have been highlighted in ranking order, such as in the OECD's analysis of factors behind success, the ecological argument has been tacitly rejected. The OECD's PISA reports have been full of models, correlations, and regressions that attempted to relate, in a causal relationship, the factors behind success. The reports have contrasted performance in, say, mathematics to variables such as gross domestic product, spending on education, parent's education, share of socioeconomically disadvantaged students, proportion of students from an immigrant background (OECD, 2013a, p. 35); opportunities to learn mathematics (exposure to practical problems, applied mathematics, formal mathematics, familiarity of concepts, frequency with mathematics content, and knowledge and understanding; OECD, 2013b, pp. 150–173); and adequate resources (financial, human, and material resources and students' learning time) that are crucial, according to the OECD, for high-quality opportunities to learn (OECD, 2013c, p. 40).

Performance has been also measured at the system, school, or student level and has been compared with socioeconomic status (SES) estimated by an index based on parental education and occupation, number and type of home possessions, and educational resources at home (OECD, 2013a, p. 37). The ranking has been established by the proportion of the variation in mathematics performance explained by elements of SES. The following elements were ranked by the size of their proportion of the variation: number of books at home, parents' highest occupational status, index of home educational resources, parents' highest level of education, and wealth (OECD, 2013a, pp. 39, 193). But a look at the ranking of each of the participating countries and economies offers quite different results for each country than the OECD's average country or economy, which is rare in reality. The same may occurs at the school and student levels of analysis. The PISA reports and countless rankings have tried to cover many simplistic relationships of isolated variables that in reality are intertwined, and without a comprehensive theory of learning, the analysis may obscure more than illuminate the story behind performance or success.

A similar story of ranking is presented elsewhere by the OECD when contrasting performance to educational resources and learning environments. Here the ranking of the aspects goes as follows: "jointly by schools' policies and practices, resources, and the learning environment and students' and schools' socio-economic and demographic profile"; "solely by schools' policies and practices, resources and the learning environment"; "unaccounted for by any of" these three aspects; and "solely by students' and schools' socioeconomic status and demographic profile" (OECD, 2013c, p. 65). What this ranking tells us is that a higher proportion of the variance (by a large difference) goes to all factors considered; followed by the aspect "solely by schools' policies and practices, resources and the learning environment." But it also tells us that the factors "unaccounted for by any of the above aspects," - that is, what we don't know - are larger than the factors we know, except when we consider all factors or aspects.

The amass-it-all data approach of the OECD can shed light on the status of a student, school, or system as long as we don't try to build causal relationships without a theory with indexes built by the perceptions of principals, teachers, or students that may construe questions from a totally different cultural or factual background. There are some cultural-driven expressions that need translation. Consider the following ranking of teacher-student relations: 54% of Polish students, 59% of Japanese students, 72% of Korean students and 73% of Finnish students agree or strongly agree with the statement, "Most teachers are interested in students' well-being." However, as high as 90% of students in Mexico, 92% of students in Portugal, and 94% of students in Indonesia agree with the same statement (OECD, 2013c, p. 170). The students in the first group of countries are

high performers, whereas the students in the second group are low performers. The awkward relationship "very low-performance vis-à-vis highly interested teachers in student's well-being" might just be explained by a hidden cultural or contextual construction of the question as it is posed to different students from different cultural and contextual backgrounds.

The purpose of this paper is to assess the extent to which the hypothesis of a single factor - teachers - is strong enough to explain the Finnish "miracle." But first, I will briefly discuss three other factors that I have identified from the literature review that follows as relevant to success: culture, equity, and education system.

Culture

Culture merits discussion. The importance of culture, very broadly defined, has been related to Finnish education as expressed here: "Learning and education are considered as an important resource to a small country during the whole national history" (Jakku-Sihvonen & Hannele Niemi, 2006, p. 7).

Furthermore, the importance of education in Finnish culture has been stated in different ways. "Education has always been seen important in the Finnish society" (Välijärvi, 2008, p. 1). Furthermore, "Finnish society strongly favors education" (Ministry of Education, 2008, p. 2). "In Finland, both education and the teaching profession have traditionally been held in high regard" (Ministry of Education, 2002, p. 6). "A career in teaching is an appreciated and popular profession in Finland" (Toom & Husu, 2012, p. 40). Other researchers also have underscored the high appreciation of teachers - or their high social status (Kansanen, 2003; OECD, 2005a) and the trust in teachers' work (Aho et al., 2006).

Remarks like these might lead to a hypothesis of "culture behind success." However, we are not likely to accept this explanation for Finland's particular success because we may find similar expressions in many other societies. It would be very difficult to find a nation that does not value education at least in the rhetoric used or based upon some hard-data indicators such as expenditure on education or enrollment rates. Finland, for instance, is more or less on par in enrollment, attainment, graduation, and entry rates with other developed nations (OECD, 2007, 2008) and is not the country with the highest expenditure in education as per GDP (OECD, 2008; OECD, 2011; OECD, 2014, p. 230), per student (OECD, 2008; OECD, 2011; OECD, 2014, p. 215), or per share of education expenses to total public expenses (OECD, 2008; OECD, 2011; OECD, 2014, p. 257). Denmark, Iceland, Korea, New Zealand, and Norway, from the OECD, are the highest when the measure is expenditure on education (all levels) per GDP (OECD, 2014, p. 230); Switzerland, United States, Norway, Austria, and Sweden are the highest when the measure is expenditure on education (all levels) per student (OECD, 2014, p. 215); New Zealand, Mexico, Brazil, Korea, and Switzerland are the highest when the measure is expenditure on education (all levels) as a percentage of total public expenditure (OECD, 2014, p. 257).

History

We cannot claim that an education culture is more deeply rooted in Finland's history than it is in the history of other countries such as Russia, Sweden, France, Italy, England, Spain, etc. "'Where Sweden was poor, Finland, was poorer,' concludes Eric Christiansen, 'in educated men, in books, in churches, in towns, in arts, in schools'" (Kirby, 2006, p. 25). If there was an impulse for education in Finland, it was even greater in other European reigns such as Sweden and Germany, or cities such as Rome, Paris, and Prague (Kirby, 2006). Finnish education began very late in history in comparison to other nations. It actually began with the first ABC book written by Mikael Agricola in 1543 and then the reader and catechism book published 100 years later under the auspices of Bishop

Johan Gezelius the Elder (Kirby, 2006). However meritorious, these efforts came slowly (Kirby, 2006).

Many decades passed before there was a dramatic turning point in Finnish education. The first school revolution in Finnish education took place in the mid-1800s when the "Finnish primary institution was established" (Simola, 2002, p. 209) and the first Finnish-speaking secondary schools were organized. The mid-1800s could be noted for the enlightenment of Finnish literacy and education in Finnish history under the influence of two great thinkers and visionaries, Johan Vilhelm Snellman - philosopher, senator, and schoolmaster (Kirby, 2006) - and Rev. Uno Cygnaeus. The ideas and actions of these Finnish founding fathers[2] together with the sharp reduction in the power of the church, in politics, and education that took place from 1865 to 1869 (Kirby, 2006) not only propelled the *Fennomani* movement forward, but also initiated the Finnish education rally, albeit late and slow.

There were some isolated efforts to establish elementary schools for the poor Finnish population in the late 18th and early 19th centuries (Ikonen, 2004), but these were scarce and never really extended to large sections of the population. Before that, school activities were conducted under the auspices of the church, sometimes through informal means, or under parents' guidance (Ikonen, 2004). Unlike higher education, elementary education did not have regular schools with professional teachers, and thus results were rather poor (Ikonen, 2004).

In short, Finnish schools and Finnish compulsory education arrived late to Finland (Simola, 2002), and when it did, it borrowed from the education and pedagogic principles developed by others (Kansanen, 2003). Therefore, parallel to "late industrialization," there was also a phenomenon of "late schooling" in Finland.

Equity

The third factor and belief around Finnish success is based on arguments related to equity or equality[3] (Aho et al., 2006; Jakku-Sihvonen & Niemi, 2006; Kumpulainen & Lankinen, 2012; Laukkanen, 2008; Malaty, 2006; OECD, 2008; Pehkonen, 2008; Sahlberg, 2006; Simola, 1994; Telhaug, Mediás, & Assen, 2006; Välijärvi, 2008; Välijärvi et al., 2002; Välijärvi et al., 2007). But even here, although Finnish students' outcomes seem to be less related to their socioeconomic backgrounds than in other OECD countries (Välijärvi et al., 2002), there is still some variation in the results within Finland in factors related to demographic structures (Kuusela, 2002), such as the level of education and professional structures (Kuusela, 2002) and socioeconomic backgrounds (Linnakylä & Malin, 2008).

Equity and equality have been and are still, indeed, very important components of Finnish education and education policy (Jakku-Sihvonen, 2002; Lavonen, 2006; OECD, 1982; OECD, 2005b). But equity in education as a policy target or policy mix is not exclusive to Finnish society. Many other countries (OECD, 1982), including the Nordic states (Välijärvi et al., 2002; Välijärvi, 2007), also stress equity as a key target in education policy (Lie et al., 2003).

Countries such as Australia, New Zealand, Flanders, England, Scotland, South Korea, Singapore, United States, Canada, Chile, and Mexico, if not others as well, have designed and implemented policies related to equity or equality such as scholarships, compensatory funding, investments to eliminate or reduce poverty, socioeconomic school integration, school vouchers, tax credits, etc. But to design and implement equality policies does not necessarily translate into equity in results or high performance, as can be seen in the cases of the United States, Chile, and Mexico.

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[2] Professor Hannu Simola names Cygnaeus a founding father (2002).

[3] For purposes of this paper, equity and equality will be treated as synonymous.

Finland is among the group of countries with high levels of equity in education outcomes but is not alone. Comparing equality, as measured by low levels of variation in mathematics in 2003 and 2012, the following countries show low levels of total variation (within and between schools) in mathematics performance: Canada, Indonesia, Denmark, Finland, Ireland, Mexico, Spain, Latvia, Thailand, and Tunisia. When the measure is only the variation in mathematics performance between schools, the following countries have a lower variance, both in 2003 and 2012: Finland, Iceland, Ireland, Norway, and Sweden (OECD, 2013a, pp. 197–198). Four of the five Nordic countries have low variance in results; therefore, while they demonstrate high equity in results, not all of them show high performance. The OECD defines success in education "as a combination of high levels of achievement and high levels of equity in education outcomes" (OECD, 2013a, p. 37). The following countries and economies share both characteristics: Macao-China, Hong-Kong China, Liechtenstein, Estonia, Finland, Canada, Japan, Korea, and Australia (OECD, 2013, pp. 36–37). Finland is the only Nordic country in this list even though Nordic countries share many equitable social policies. Having said that, Finland does indeed show high equity levels in SES and education outcomes.

Education System

If we turn our attention to another identified factor, the education system, we find that many features are included: comprehensive education (Finnish National Board of Education, 2007b; OECD, 1982), centralization, decentralization, governance, educational planning, leadership, devolution of power, and curriculum (Lavonen & Juuti, 2012). Further, there are even more, such as: entrance age, less time in school and doing homework, evaluation policies and practices, (Kumpulainen & Lankinen, 2012), the introduction of new curricula in 1994 and 2004, the elimination of inspectors in the early 1990s, more inclusion in school policies or practices (Finland has the largest socioeconomic and academic inclusion rates of all OECD members; OECD, 2013c, p. 296), reduction of the number of schools, following more drastic reductions in previous years (Finland has dramatically reduced the number of schools in the last five years; from 2008 to 2013, the number of comprehensive schools decreased from 3,200 to 2,600; Statistics Finland, 2014). From my own personal visits to schools and interviews of teachers and principals, the system has also moved to more personalized learning, more awareness of special education children, and more information and communication technologies in schools (Andere, 2014).

Many of the same experts that portray culture and equity as the main factors in PISA success also mention the Finnish education system, specifically Halinen (2008a, 2008b, 2008c, 2008d), Aho et al. (2006), Sahlberg (2006), Välijärvi et al. (2007), and Ahtee et al. (2007). The list of features that may be inserted within the category of "education system" is potentially endless. Therefore, to use the "education system" argument as the key factor of success is tantamount to saying that many factors are behind education success.

Teachers

We turn now to teachers and teaching quality. Teachers are identified as the key factor (Carnoy et al., 2009), the most important variable (Hargreaves et al., 2007), the one that "trumps all others" (Sahlberg, 2011, p. 70), and the "main driver" (McKinsey & Company, 2007, p. 12) in explaining student achievement and variation. There seems to be a strong consensus from many sources, as seen below, that teacher quality, defined in a very broad sense - to include quality of teachers and teaching - is behind the Finnish education success (Ahtee et al., 2007; Jakku-Sihvonen & Niemi, 2006; Laukkanen, 2008; Lavonen et al., 2007; Malaty, 2006; McKinsey & Company, 2007; McKinsey & Company, 2010; Melgarejo, 2006; Ministry of Education, 2008; Perkkilä & Lehtelä, 2007; Sahlberg, 2006; Simola, 2005; Välijärvi, 2008; Välijärvi et al., 2002; Välijärvi et al., 2007) .

Moreover, even public opinion in Finland points to teachers as the main factor of success: "Explanations of, and the underlying reasons for, the Finnish success in international comparative assessments have been eagerly sought ever since. According to public discussion, it is unequivocally attributable to the excellent Finnish teachers and high-quality Finnish teacher education" (Simola, 2005, p. 456).

In a similar vein, Professor Jouni Välijärvi (2008, p. 23) concluded: "An evident strength of the Finnish basic education is attributable to teachers' high professional competence and their strong ethical commitment to their work." And, the Finnish Ministry of Education (2008) stated:

> On all school levels, teachers are highly qualified and committed. They require Master's degrees, and teacher education includes teaching practice. As the teaching profession is very popular in Finland, universities can select the most motivated and talented applicants. Teachers work independently and have strong autonomy towards their work.

Therefore, there seems to be strong consensus among researchers, experts, public opinion, government, and professionals that the high quality of Finnish teachers is the main or one of the main factors of success in students' education as measured by standardized tests. The OECD stated, "Teachers are an essential resource for learning: the quality of a school system cannot exceed the quality of its teachers" (OECD, 2013c, pp. 96, 191).

This is a strong sentence borrowed by the OECD without credit from McKinsey & Company[4] (2007, p. 4, 13), which instead borrowed it from a "South Korean policymaker" (McKinsey & Company, 2007, p. 16). The sentence could lead to a misinterpretation of the teachers' influence on learning: if there is no learning or there is deficient learning, then, it must be teachers' fault.

Why Does Finland Have Such a Fine Cohort of Teachers?

One possible answer to this question, which is apparently taken for granted by public opinion in Finland, is the popularity of the teaching profession, especially for class or primary school teachers. The teaching profession is believed to be very popular and one of the most popular professions in Finland (Finnish Ministry of Education, 2008; Kansanen, 2003; Laukkanen, 2008; McKinsey & Company, 2010; Niemi & Jakku-Sihvonen, 2010, 2009; Simola, 2005; Välijärvi, 2008). Thus, the universities have a large pool of candidates from which to choose (Finnish Ministry of Education, 2008). And with a highly selective pool of students enrolled, university pre-service programs synergize to create a unique, highly qualified class of teachers.

Even so, does the ability to select the best and the brightest come from the popularity of the teaching profession? Having a large pool of candidates does not necessarily mean that the popularity of the program is relatively high. For instance, compared to other university programs or areas of study, education seems to be on or below par in popularity.

One way to measure the relative popularity is by looking at the number of applications to all university programs. Consider, for example, Helsinki University, which houses by far the largest number of university students. According to data provided by the KOTA database available online

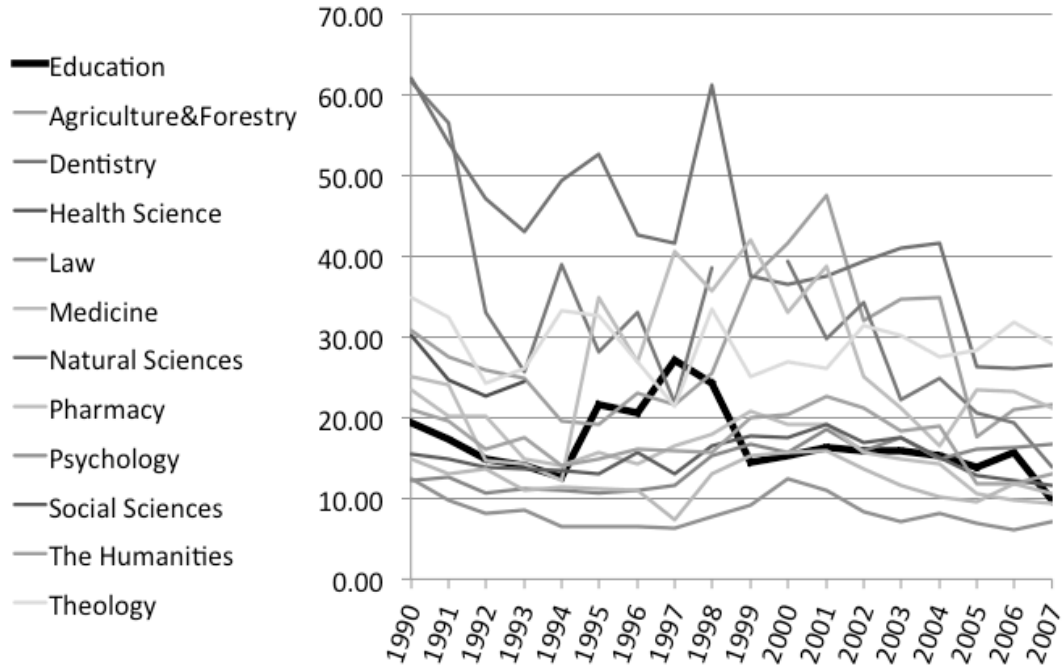
[4] McKinsey & Company is one of the largest global consulting firms with operations in many industry, public, and social sectors, one of which is education. According to their website: "In the past five years alone, we have worked on more than 400 education projects in over 60 countries. Across all of our projects, we focus on helping clients deliver substantial and lasting improvements in student outcomes. At any time, we have over 70 consultants working on education projects around the world, many of whom have previously served Continued: as teachers, policy makers, institutional leaders, researchers, and education entrepreneurs." (http://www.mckinsey.com/client_service/social_sector/expertise/education) (January 26, 2015).

at the time of writing (Ministry of Education and Culture, 2010), the total number of applicants to all programs at Helsinki University for 2007 was 31,703, of which 4,475 (14.12%) were applicants into all education programs; 7,417 (23.40%) were applicants into natural sciences; 6, 275 (19.79%) were applicants into the humanities; and 5,001 (15.77%) were applicants into social sciences. Furthermore, 2007 and 2008 were years with unusually high numbers of applicants into education programs, probably due to the fact that the rules for admission into the class teacher programs had changed. The rules for admissions changed for the majority of universities that offer education and teaching programs. Before this change, applicants were given points based on their Matriculation exam (an exit exam all high school students must take at the end of high school). Now students applying to a consortium of seven universities must take a national selection test known as *Vakava*. Students who have applied for and taken the Vakava test must comply with further requirements set by each program in each university.

If we look at the entire spectrum of university courses, other professions have competed with teaching to be the most popular program. In 2006, there were 176,555 students enrolled in Finnish universities. Of this total, 14, 286 (8%) were enrolled in teacher education and educational science topics. For the same year, there were 44,715 (25%) students enrolled in the social science and business fields (Statistics Finland, 2007, p. 395). Actually, within this ranking, teacher education and educational science fall behind in popularity to social sciences and business, technology, humanities and arts, and natural sciences (Statistics Finland, 2007, p. 395). However, we have to be careful since many programs may fall within the category of the social science and business fields, and this could lead to an unfair comparison.

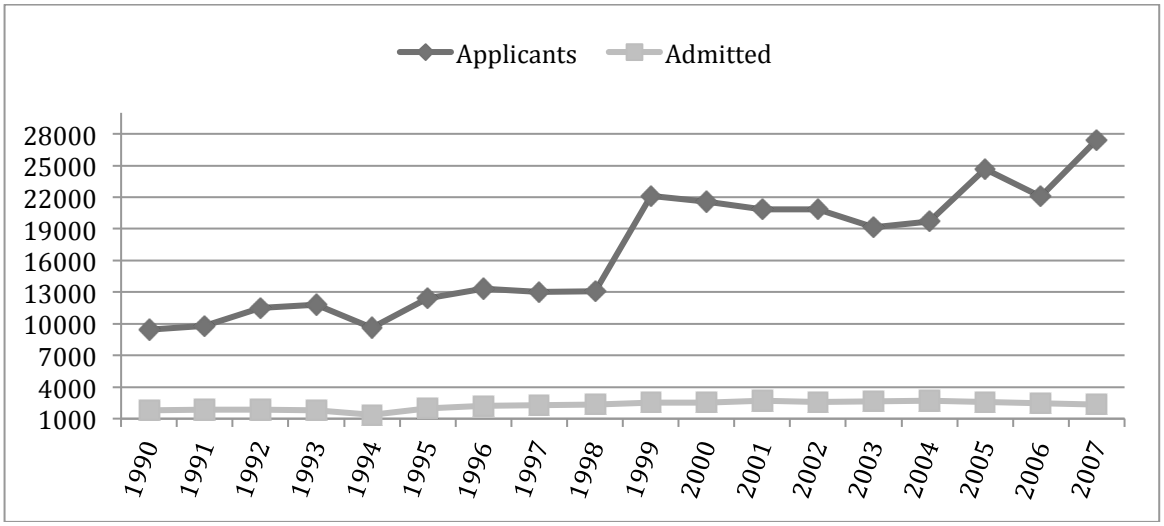
In the early 1980s, education as a whole was not the most popular field of university studies in terms of the enrollment distribution either, although the relative distribution has changed over time: the arts and humanities' share of total higher education enrollment was 17%; economics, business administration, law and social sciences, 27%; education and theology, 14%; natural sciences, agriculture and forestry, and physical education, 18%; technology, 16%; and medicine and paramedical training, 8% (OECD, 1982, p. 111).

Moreover, the teaching profession has not always enjoyed the highest selection ratio (percentage of admissions to applications) for all programs and all Finnish universities. Graph 1 shows the trend in the admissions/applicants ratio for all programs since data became available in KOTA. Helsinki University is a good example, not only as the largest Finnish university, but also as the one with the largest menu of university programs. The thickest line in the graph shows the admissions/applicants ratio for students in all education programs. Even though education is among the programs with the lowest ratio (low admissions to the number of applicants), it has not been the lowest either in past years or more recently. There is also a tendency in all programs to converge to very low admissions/applicants ratios as we approach 2005 and beyond.



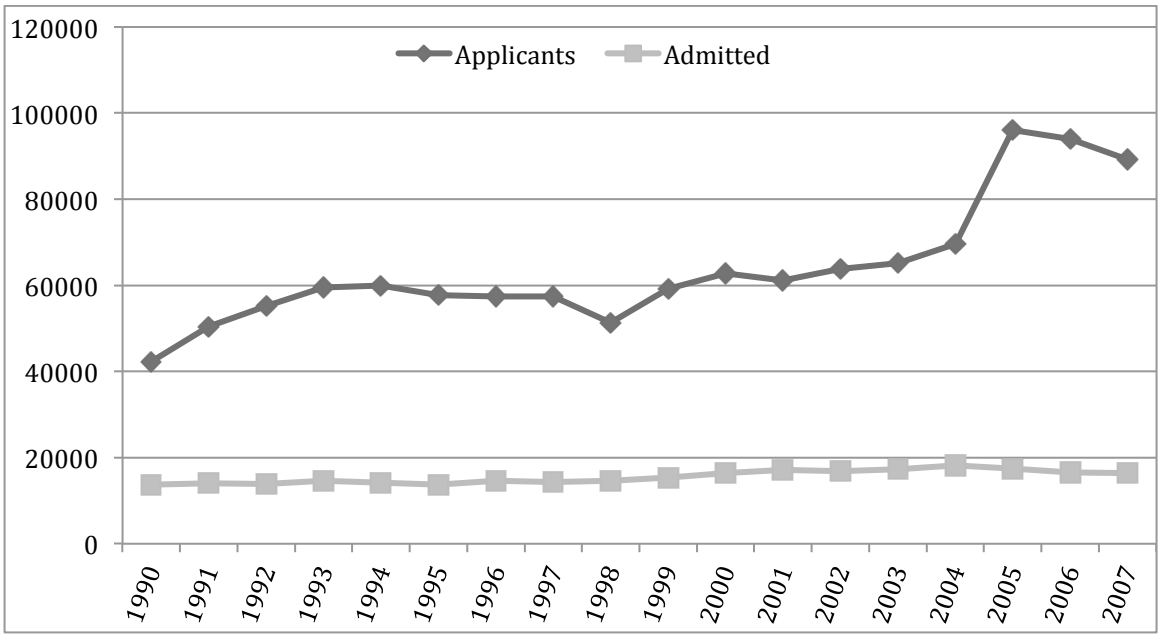
Graph 1. University of Helsinki: Percentage of admitted to applicants. All programs.

Furthermore, over the years, the ratio of the number of applicants to all programs (not only education) has increased steadily despite very strong entrance requirements. If the admission rate has been relatively constant or decreasing despite a higher demand, the only possible explanation is a quota policy based on the *numerus clausus* principle (Niemi & Jakku-Sihvonen, 2009, 2010). *Numerus clausus* is the Latin expression known mainly in Europe for a strict quota control over the supply of higher education services. In this sense, universities in Finland are not free to admit, to a specific program, as many applicants as they accept. The Ministry of Education sets every year, in a centrally planned fashion, the maximum number of admissions to the different programs, hence the name *numerus clausus*. Graph 2 shows the ratio of admitted students to applicants for education programs in all universities in Finland. We can see a steady increase in demand (upper curve) with firm control over supply (due to *numerus clausus*), as the lower flat curve at the bottom of the graph indicates.



Graph 2. Applicants and admitted to education programs at all univesitires with education programs.

Graph 3 shows about the same pattern of admissions/applications for all other programs (all programs except education programs) in all universities offering education programs. Demand for university degrees has increased dramatically. No less dramatic has been the *numerus clausus* control. This is part of an educational and labor-planning policy attempted in Finland since at least the late 1960s as a means to strengthen the relationship between education and the labor markets (OECD, 1982).



Graph 3. Applicants and admitted to other programs at all univesitires with education programs.

Consequently, Finland does not have a free supply-demand market for university programs; the government closely controls the supply. This is a policy recently criticized by the OECD (2008, 2010) for going against "market signals" but was praised by the same organization three decades ago for "[a] successful linking of educational to occupational opportunity" (OECD, 1982, p. 14) or escaping "from the problems that can arise from a surplus of graduates" (OECD, 1982, p. 24).

Since the supply of student admissions is centrally planned, each university is not free to open as many admission spots as it pleases. There is of course high demand in relation to the limited number of available planned spots. National authorities carefully plan the number of admissions to teaching schools in relation to demographic patterns and employment expectations, which are fairly predictable for the education sector. National authorities make certain they do not have an over- or under-supply of teachers nationally or regionally. This in turn may create the expectation among students that, once they have been admitted into a teaching program, the chances of obtaining a secure and permanent job are very high because only a few teachers are trained yearly to meet the demographic and job market expectations for teachers.

Furthermore, many students make the decision to apply to a teaching program after they have tried something else or have worked as substitute teachers for one or two years or one, two, or three years after the matriculation exam. In this sense only, students actually queue for admission (OECD, 2008, p. 134). This has both advantages and drawbacks. On the one hand, students make a more balanced and intrinsically motivated decision to study at a university and pursue a teaching career, but on the other, their entrance into the job market is delayed, and this stresses public finances and their contribution to development.

Due to the *numerus clausus* policy, some programs - including education and teachers' training programs - show a much lower proportion of admissions to applications. The *numerus clausus* system provided ample room for teacher education departments to select students for the 2010 cohort (Niemi & Jakku-Sihvonen, 2010) at a ratio that ranged from one admission to 14 applications for the University of Jyväskylä and from one admission to five applications for the University of Joensuu (in 2010, this university was merged with the University of Kuopio to create the University of Eastern Finland). Taking all universities into account, the ratio for 2010 was around 1 to 10 (Niemi & Jakku-Sihvonen, 2010). With *numerus clausus* becoming more selective and therefore competition among students more stringent, universities can select the students they consider "highly motivated and multitalented" (Niemi & Jakku-Sihvonen, 2010, p. 9).

Numerus clausus, or strict control over the supply of higher education services, is only one of the factors in securing high academic standards in the selection of candidates. The other is a very strict, new, national, standardized entrance examination for class teachers (Vakava). Subject teachers may present other exams or requirements as established by the university departments to which they apply for admission. Nevertheless, what if the candidates attracted to the profession are not high caliber (high performing) from an academic point of view? After all, attracting high-caliber students to the teaching profession has been considered by some to be a key factor in education success (McKinsey & Company, 2007; OECD, 2005a). Well, this does not seem to be the case in Finland, since pre-university education is not only very prominent in students' mean scores but also in the levels and equality of performance: students who are 15 years and three months to 16 years and two months old perform at a high level on PISA with a relatively very low variance in the distribution of scores as we have mentioned before. If the quality of education for 15- to 16-year-old students is sustained through high school (upper secondary), then the situation today is that most of the applicants to most of the university or polytechnic programs will have a very sound pre-university background. In other words, the quality of the teaching force in Finland begins with the quality of its comprehensive, basic education. If the quality of pre-university training is very high for most students in Finland, and they are subject to very stiff competition by a limited ratio of applicants to admissions, universities indeed have a very highly selective breed of teachers-to-be. So, this suggests that the relationship of teacher quality to student performance perhaps works the other way around. High student performance at the pre-university level nurtures the high quality of the pre-service teachers' programs.

To sum up, the quality of teachers in Finland seems to be due to two immediate factors: 1) *numerus clausus* and therefore ample opportunity for universities to select the best and the brightest in a rigorous and competitive application process; and 2) high-quality pre-university education for all.

Does the Quality of Teachers Indeed Explain High Student Performance on Standardized Tests?

There are two hurdles we must overcome in order to establish a causal relationship between teaching quality and student performance. The first, which seems insurmountable, relates to the definition of teachers and teaching quality. Secondly, comparative evidence in education seems to shed some doubt as to whether the quality of teachers and teaching quality is crucial for student success if we define quality as high-caliber attraction and strong teacher pre-service university training programs, as seems to be the case with Finland.

Quality of Teachers

What do we mean when we refer to the quality of teachers? We all think we know what a good teacher is, but when it comes to defining and measuring good teachers against specific indicators, competencies, or skills, the matter is less clear. For instance, does the level of their pre-service training define the quality of teachers? Or is it defined by the way they "connect" with students, or by their skills in handling learning, behavior, discipline, motivation, or attitudes?

When we begin to explore these definitions of quality, there are inherent hurdles of meaning and measurement. In other words, data gathered by the OECD through context questionnaires may very well be contrary to what really happens in each country. For example, it is suggested that Finnish teachers "connect" with their students, as in warm human relations (Linnakylä & Brunell, 1996, pp. 213–214). And, this has been my observation during my many visits to schools in Finland since 2004 and presented in two publications (Andere, 2010, 2014). However, this observation contrasts with the finding that Finnish students, on average, have shown a consistently weak relationship with their teachers. They have positive attitudes toward school, but one of the weakest teacher-student relationships is found in Finland (Linnakylä & Malin, 2008). It is interesting to see that the same professor, Linnakylä, uses the OECD's data to contradict her own perception in 1996. Indeed, data from the OECD suggest that on average Finnish students have worse teacher-student relations than the students in OECD's average. That was true in 2003 and was still true in 2012. More striking is the comparison between Finland and Mexico, the consistently highest and lowest OECD performers, respectively, on PISA since 2000 until 2012 (OECD, 2013c, pp. 461–463.) The OECD's "index of teacher-student relations" is constructed by the answers to five different questions: "students get along well with most teachers"; "most teachers are interested in my well-being"; "most of my teachers really listen to what I have to say"; "if I need extra help, I will receive it from my teachers"; and "most of my teachers treat me fairly." In all cases except one, a greater majority of students from Mexico than from Finland answered positively, and this is true for 2003 and 2012. This means that even though students in Mexico have better teacher-student relations than students from Finland, they perform at the bottom. The suggestion also contrasts with the assertion by the OECD that Finnish students seem to demonstrate more disciplinary problems - a concept in itself subject to different interpretations across cultures and education systems - in the classroom than the OECD total average, well above most OECD's countries (OECD, 2013c, pp. 186, 464-466.)

In addition to the problem of defining "teachers' quality," there is the hurdle of measuring the variables, as many of them are unobservable. To avoid this meaning-of-quality trap, researchers

resort to the few variables that are observable, or proxies. In the end, scholars pick one or two variables, expecting to choose the one with the strongest weight in explaining teaching success, "usually teacher education, experience, and measures of teacher attitudes" (Carnoy et al., 2009, p. 19), or the attraction/selection of students into pre-service teaching programs and the quality of pre-service university training (McKinsey & Company, 2007; OECD, 2005a). But even with the latter, a more reductionist definition or proxy for teacher quality, the evidence does not seem to guarantee a causal relationship between teachers' quality and students' performance. The next section uses an international comparative perspective to elaborate on the difficulties of using attraction of teacher candidates and/or providing pre-service training as the proxy variables to relate teacher quality to student performance.

International Comparative Examples Attracting Teacher Candidates

Assuming that the attraction and training variables are good proxies for teachers' quality, and therefore for explaining students' high performance, what can we learn from examples in countries other than Finland?

From recent OECD data (2013a), we know that the following countries do not require an entrance examination to enter pre-service training: Belgium Flanders, Belgium France, England United Kingdom, Hong Kong-China, Iceland, Japan, Latvia, Liechtenstein, Montenegro, New Zealand, Poland, Qatar, Singapore, Sweden, United States, Uruguay, Canada, Czech Republic, Denmark, Estonia, France, Italy, Luxembourg, Malaysia, Netherlands, Norway, Peru, Portugal, Scotland, Slovak Republic, Spain, and Switzerland. On the contrary, countries that require competitive entrance examinations are: Australia, Bulgaria, Croatia, Greece, Israel, Lithuania, Macao-China, Romania, Shanghai-China, Chinese Taipei, Vietnam, Austria, Colombia, Finland, Germany, Hungary, Indonesia, Ireland, Korea, Mexico, and Turkey (p. 97). This comparison misinforms rather than informs about the quality status of pre-service teaching selection and training policies because it does not account for the quality or rigor of the competitive examinations nor does it take into account the popularity and therefore selectivity of upper secondary students to go into the pre-service university training.

As an example of potential misinforming, Flanders, the Netherlands, and most recently Poland, which are countries or regions that do not require an examination to enter a pre-service training program, have performed or are performing at the same level or higher than Finland on PISA, at least in mathematics. Furthermore, from my interviews with teachers, principals, and experts conducted during 2013 in Flanders and the Netherlands and 2014 in Poland, these countries do not seem to attract high-caliber students to the teaching profession in the same way Finland filters very talented high school candidates. Although my interviews cannot be generalized, all were very consistent with the fact that the teaching profession is not very popular among high school students, that the students are not filtered by exams or *numerus clausus*, and with the sheer duration and practical orientation of the pre-service teaching programs. Whereas the duration of the teacher-training program in Finland for primary and lower secondary education is five years, in Flanders it is three years, in the Netherlands four years, and in Poland three or five years (OECD, 2013a, p. 316). One additional piece of evidence for the lack of demand, interest, or popularity of the teaching program is the fact that in the coming years Flanders will face a dramatic scarcity of teachers[5]. In the words of one of my interviewees, who at the time of the interview was an advisor to the Minister of Education:

[5] Interview with Paul Yperman, advisor to the Minister of Education, Flanders, on November 8th, 2013, at his Brussels office.

> We have a scarcity of teachers in front of us, especially with teachers holding a master's degree (who are those teaching at the secondary level, since teachers at the primary level almost all them hold a bachelor's degree only), because the teaching profession is so unattractive. To make things worse, large numbers of teachers will be retiring in a couple of years. If we don't take firm policy measures we will have a shortage of 20,000 teachers in primary and secondary education together by 2020. There are around 56,000 teachers at the secondary level of which more or less 35 per cent of them hold a master's degree; this is the size of the challenge.

In Flanders, students are accepted into teacher-training colleges with no actual pre-requisite other than a high school-level diploma or certificate. They pursue a three-year-long teaching program - compared to five years in the Finnish case - based on practically oriented content. After Flemish students have finished a university program, their age upon entering the teaching profession is 21 or 22. In contrast, this is the regular entrance age of students into teachers' colleges in Finnish universities after high school. The final decision on a university career in Finland is not made at *lukio* (high school), but one, two, or three years later (OECD, 2008). Despite the huge differences between these countries - in the attraction and selection of students to the teaching profession and the pre-service teacher training programs - Flanders' students have shown very high performance on PISA, too. In the results from PISA 2003, Flanders' students had the highest mean score in mathematics (OECD, 2004, pp. 356, 453) and by far the largest proportion of students at the two highest proficiency levels (OECD, 2004, pp. 354, 451). Table I shows that Flanders also performed higher than Finland in 2012.

Results from PISA 2012 compared to PISA 2003 highlight even more clearly the point I am trying to make here (OECD, 2004, p. 453; OECD, 2013b, pp. 48, 306).

Table 1
PISA 2003-2012 Scores in Mathematics: Selected Countries

Country or economy	Average scores 2003	Average scores 2012	Change 2003-2012
Finland	544	519	-26
Flanders	553	531	-22
Netherlands	538	523	-15
Poland	490	518	27
United States	483	481	-2
Mexico	385	413	28
OECD	500	496	-3

As explained before, neither Flanders nor the Netherlands nor Poland has as strong an attraction and pre-service teachers' training programs as Finland has; nevertheless, they performed as high as Finland in mathematics in 2012.

One additional comparative example may provide some further evidence that the quality of an education system, as measured by international standardized tests, may surpass the quality of its

teachers. Again, Finland is often shown as an example of a high-caliber teaching force; on the contrary, Mexico, the lowest performing OECD economy on all PISA rounds, is not recognized as a country with a strong teaching force. However, from PISA 2003 to PISA 2012, Finland's loss and Mexico's gain in PISA points in mathematics was 26 and 28, respectively (Table 1).

The teaching profession in Poland, as said before, does not seem to be popular and does not require a competitive entrance examination to enter pre-service teaching. Nevertheless, Poland not only significantly increased scores in mathematics from 2003 to 2012 but also tied with Finland in both mathematics and reading.

Mexico and Poland showed the two largest point increases of all OECD member countries in mathematics from 2003 to 2012. This extraordinary increase in performance from two countries with low popularity and less-than-rigorous selectivity of students to the teacher profession, plus the significant decrease in points by Finland and the relatively stable and yet high performance from Flanders, show that something other than the teacher hypothesis could be behind the performance of students. Therefore, something else unrelated to attracting the right students to become teachers or providing high-level training, as suggested by McKinsey & Company (2007, pp. 13, 16, 26), appears to be behind the high levels of student performance. We may need a more precise or different definition of teachers' quality or a different assessment tool of students' performance.

According to the OECD, 41 points on PISA means one whole formal school year (OECD 2013b, p. 46). The sum of the points that Mexico gained (28) and the points that Finland lost (26), i.e., 54 (that is, closing the gap by more than one year of schooling), from countries with such different teaching forces, is one additional piece of evidence that either PISA points miss the point and/or teachers' quality are not behind this dramatic change between the consistently highest and consistently lowest performing OECD countries on PISA: Finland and Mexico.

At the beginning of this paper, I highlighted the view that many intertwined and sometimes inseparable factors for a "*ceteris paribus*" analysis dubbed as the "ecological" or random view of education might be the best model to explain change or variance in educational outcomes. With this in mind we may suggest, contrary to the OECD's and McKinsey & Company's dictum, that the quality of an education system, as measured by international standardized test results, may after all surpass the quality of its teachers. What all this means is that we will probably never be able to separate the key factor behind success for all students, schools, or systems of education.

Pre-Service Training

Is the highly regarded pre-service university teaching training program in Finland the main factor behind student success? Finnish teachers are not the only teachers highly educated to the level of a master's degree or through a full-time university program with four or more years of studies for primary or class teachers. In countries such as France, Germany, Ireland, Japan, Slovak Republic, and Scotland, four or more years of full-time studies have been required for primary or class teachers (OECD, 2005a, p. 106). For lower secondary teachers in countries such as Austria, Czech Republic, France, Germany, Greece, Israel, Italy, Japan, Mexico, New Zealand, Portugal, Slovak Republic, Spain, Sweden, Switzerland, and Scotland, teacher candidates have had similar or even higher study loads than Finnish teachers (OECD, 2005a, p. 106). In France, for instance, teacher candidates are subject to a very competitive post-degree training (conducted by the *Instituts Universitaires de Formation des Maitres*) in preparation for a strict two-round national state exam and have similar or higher study loads than Finnish teachers.

More recent data (OECD, 2013c, p. 97) show that Finland is not the only country that has a relatively long duration of a pre-service training program (more than 4.3 years); the following countries also have such a program: Canada, Czech Republic, Denmark, Estonia, France, Italy,

Luxembourg, Malaysia, Netherlands, Norway, Peru, Portugal, Scotland, Slovak Republic, Spain, Switzerland, Austria, Colombia, Germany, Hungary, Indonesia, Ireland, Korea, Mexico, and Turkey.

From the compiled data offered by the OECD (2005a, 2013a), we might conclude that it is not the number of years that students attend pre-service teacher training programs or the level of the degree (undergraduate or graduate) or the type of university (public or private) that makes the difference between teachers' pre-service training and students' performance as measured by standardized tests. Nor can we draw conclusions from a simple comparison between Finland and Flanders, the latter with a much less demanding pre-service teacher training program for basic school (elementary and lower secondary) lasting only three years (Kennedy et al., 2007; OECD, 2013c, p. 316), and yet with very high performance in terms of student outcomes on PISA. Nor will we find the answer in a comparison between Finland, France, and Germany, countries in which pre-service training and preparedness is much more demanding, but in which students' performance is not particularly similar. Furthermore, in Mexico and Finland, which are clustered together in the same group, "long duration or pre-service training programme" and "competitive examination to enter pre-service training" (OECD, 2013c, p. 97) have shown opposite performance results for more than a decade. At this level of analysis, Mexico and Finland seem to have the same "pre-requisites" for high performance, yet a more detailed comparison of the two programs shows vast differences in the number of hours of study. Table 2 shows the comparison of pre-service teaching training programs for both Mexico and Finland (calculations made by the author based on pre-training class teachers' programs for both countries). Remember that these two countries are the consistently lowest and highest OECD performers on PISA since PISA 2000 to at least PISA 2009. Table 2 shows a huge difference, almost twice as large in Finland, in the number of hours of work expected by the students given the unit-credit loads in each program. This quantitative comparison does not take into account other, perhaps more important differences that may arise from the contents in terms of subjects to be studied in each program and the quality of teaching and learning per subject and the general rigor of the program.

Table 2
Pre-Service Training Programs for Class Teachers

Requirements for diploma or certificate	Mexico BA	Finland BA	Finland Master	Total
Unit credits	448	180	120	300
Units converted into hours of study	10.29	27	27	27
Units converted into hours of study per program	4,610	4,860	3,240	8,100

The question still remains: Why do countries as different from Finland in their policies and practices for attracting and training students and teachers, such as the Netherlands, Flanders, and Poland, perform as high as or higher than Finland? And why have countries with no recognition for their strong teaching force, such as Poland and Mexico, shown dramatic improvements in mathematics from 2003 to 2012, at the same time that Finland showed a significant decrease by the same magnitude?

In order to make a thorough comparison of pre-service training programs, it is necessary to get "inside" them (Tryggvason, 2009) to account for their own intrinsic quality in terms of variety, depth, and length of subject studies, practical and research-oriented courses, quality of the university, on-site practice, and so forth. According to the OECD, the following countries are clustered together in the same category "Competitive examination to enter pre-service training" and "Relatively long duration of pre-service training programme (more than 4.3 years)": Austria, Colombia, Finland, Germany, Hungary, Indonesia, Ireland, Korea, Mexico, and Turkey (OECD, 2013c, p. 97).

In no way can we cluster together so many different education systems, teachers' attraction, and pre-service training programs as those in Finland and Mexico. There may also be other factors impossible to isolate that make the difference, such as an array and synergy of traits, behaviors, and characteristics that could be associated with a definition of teacher quality and more related to motivation, attitudes, commitment, collaboration, and collegial exchanges, for instance.

Conclusion

It seems there are two factors in teachers' quality in Finland beyond the oft-cited popularity argument, specifically the *numerus clausus* policy plus job security and the high quality-low variance of student pre-university performance.

However, based on a country with an extremely highly selective cohort of teachers-to-be, we can hardly extend these factors (attraction and pre-service training), as suggested by McKinsey &

Company (2007) and the OECD (2005a), to other educational systems, since we have at least some examples from Flanders, Poland, and the Netherlands, countries with a non-selective pool of teachers-to-be and a less demanding pre-service teacher training program, which performed as high or higher than Finland in mathematics on PISA 2003 and PISA 2012. Furthermore, Finland, France, and Germany have very strict venues for training and testing teachers before they actually teach in schools, yet the three countries show significantly different levels of student performance. And even more, even though Mexico and Finland are clustered together with the same profile of teacher pre-service training across countries (OECD, 2013c, p. 97), they actually have very different profiles, and yet Mexico improved in mathematics by the same magnitude by which Finland worsened from PISA 2003 to PISA 2012. A similar situation has been shown between Finland and Poland.

From this analysis of the Finnish case and comparison to other international examples, plus the difficulties of defining teacher and teaching quality, we cannot conclude that a highly selective cohort of teachers-to-be (attraction) and a highly qualified pre-service university training program is the only or main policy mix to a high student performance, nor can we discard the possibility. What we may suggest is that other factors, most likely pertaining to culture (value of education by parents and society), context (parents' level of education), the quality of pre-university education, which are specific to each educational system, and the different elements used in defining "teacher quality" other than attraction and pre-service training, which are difficult to measure and include motivation, attitudes, and interaction, could be involved in the causal relationship with high student performance. This is without taking into account other factors that have been considered important, such as poverty, equality, segregation, or even grit. "Many factors intertwined and inseparable" is the best hypothesis behind success or failure.

The first lesson for policy makers is that no matter how hard we try to understand the factors behind success, it is virtually impossible to isolate one factor, teacher quality or teaching quality, or any other factor for that matter, as the only or main factor to explain either the outcome or the variance of performance for all students, schools, or systems of education. Of course, we want highly qualified teachers in every school, but teachers and teaching alone are not enough. Furthermore, there is no such thing as the right definition of teacher quality and teaching quality; it changes all the time. What works in Finland does not necessarily work in Flanders, the Netherlands, Poland, France, Germany, or Mexico, or vice versa. Policy makers should broaden their scope when pinpointing teachers as the main factors for the success or failure of their students.

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