

INVESTING IN AN INTERCONNECTED WORKFORCE:
GLOBAL EDUCATION REFORM

by

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ABSTRACT

Regardless of culture, socio-economic background, and quality of life, all students deserve the highest quality of education. But the reality is, many education systems around the world do not offer it. Investing in structural reforms in education has the potential to boost economic growth in countries around the world. By learning from different education systems strengths and weaknesses, policy decisions can be made that ensure students are given the opportunity for higher educational outcomes. This study analyzes high, middle, and low quality education systems around the world and the infrastructures that lead to educational success or failure. Fifteen education systems are chosen for this study which includes Shanghai-China, Singapore, Japan, Finland, Canada, Portugal, United States, Luxembourg, Spain, Hungary, Brazil, Argentina, Indonesia, Qatar, and Peru. Each system is analyzed in terms of its teacher quality, curriculum, school system structure, and educational equity. From this study, it appears that there is a high-correlation between four indicators and top- educational success. These four indicators include having a highly selective model for hiring teachers, recruiting teachers from a top-pool of graduates, having a high-level of prestige held for teachers in society, and insuring students of low socio-economic status are given equal educational opportunities for success. Recommendations for a new teacher training and selection model are discussed based on the top four indicators. These recommendations could cause educational gains for both the United States and other systems around the world.

DEDICATION

For all of the outstanding teachers I was lucky enough to have in Gulf Breeze, Florida.

Ms. McMahon, Mrs. Spicer, Mrs. Broach, Mrs. Routh, Mrs. Vachianno, Ms. Rufo, Mr. Routh,
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Everyone deserves a teacher as wonderful as you all.

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Introduction

All humans, regardless of culture, socio-economic background, and quality of life need access to the highest quality education and the opportunity to succeed in the increasingly interconnected global workforce (OECD, 2011d). Investing in structural reforms in education and skills development to boost productivity in the workplace is key to future economic growth in all countries around the world (OECD, 2011d). Learning from common educational strengths and weaknesses is crucial towards achieving an effective global market, and ensuring investments are being made towards the success of all citizens around the globe.

Purpose

The purpose of my study is to analyze high, middle, and low quality education systems around the world and the infrastructures that lead to educational success or failure. This study examines common factors in government systems and school curricula demonstrated in the literature to represent education quality. For my study, I analyze five top-performing, five-middle performing, and five-low performing education systems. These fifteen education systems include Shanghai-China, Singapore, Japan, Finland, Canada, Portugal, United States, Luxembourg, Spain, Hungary, Brazil, Argentina, Indonesia, Qatar, and Peru.¹ Recommendations for a new teacher training and selection model are discussed based on the top four indicators. These recommendations could cause educational gains for both the United States and other systems around the world.

These policy recommendations could help move middle performing regions towards achieving comparable results of high performing regions, and assist low performing systems towards reaching similar results of mid performing systems. In addition, a detailed policy program for the United States education system is made based off of the research findings. While it is impossible to come up with an exact combination of education policies and practices that would create educational success for all regions, it is indeed possible and necessary to pinpoint trends in best practices and policies that can assist policy makers close educational gaps.

¹ Although Shanghai is a city instead of a country, the city of Shanghai has an education system that differs from the rest of China and functions with its own education policies. Singapore, although not a country but a micro state, functions with its own education policies as well.

Literature Review

Since 2000, the Organisation for Economic Co-operation and Development (OECD) has conducted the Programme for International Student Assessment (PISA) which has become the world's most trusted measure in evaluating efficiency, quality, and equity of school systems (OECD, 2012c). PISA's statistical benchmarking and comparisons to other systems allows local governments to identify effective policies they can adapt in their own countries (OECD, 2012d). PISA first analyzed the education systems of 32 countries in 2003, and by 2012 the study expanded to 65 countries and economies (OECD, 2012c).^{2 3} Extensive resources and efforts are dedicated towards attaining a linguistic and cultural balance in PISA assessment materials. As data collection and sampling in each country is subject to strict quality controls, PISA findings are considered to be both highly dependable and valid (OECD, 2012c).

The Programme for International Student Assessment focuses on mathematics, science, reading and problem solving, and for the first time in 2012, PISA also included an assessment of financial literacy (OECD, 2012c). In 2012 math was PISA's major focus area. For PISA, math proficiency is measured by the "capacity of individuals to formulate, employ and interpret mathematics in a variety of contexts" (OECD, 2012c). The term "math proficiency" describes the capacities of individuals to reason mathematically and use mathematical procedures,

² The OECD countries participating in the 2012 PISA study include Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and The United States (OECD, Singapore: Thinking Ahead, 2012).

³ Partner countries and economies in PISA 2012 include Albania, Argentina, Brazil, Bulgaria, Colombia, Costa Rica, Croatia, Cyprus, Hong Kong-China, Indonesia, Jordan, Kazakhstan, Latvia, Liechtenstein, Lithuania, Macao-China, Malaysia, Montenegro, Peru, Qatar, Romania, Russian Federation, Serbia, Shanghai-China, Singapore, Chinese Taipei, Thailand, Tunisia, United Arab Emirates, Uruguay, and Viet Nam (OECD, Singapore: Thinking Ahead, 2012).

concepts, and tools to describe and predict phenomena (OECD, 2012c). PISA mathematics has been measured five times since 2000. This gives the chance to analyze changes in performance by students in mathematics in the context of policies, teacher development, and other educational factors (OECD, 2012c). PISA does not only assess whether or not students are able to reproduce knowledge but whether or not they are able to take the knowledge that they have learned and apply it to new situations. The test places heavy emphasis on the capability to understand processes and concepts, as well as the skill of applying processes and concepts to various situations (OECD, 2012c). In 2012, close to 510,000 15-year olds completed the assessment. This represented about 28 million students in the schools of the 65 participating countries (OECD, 2012c).

The PISA test lasts two hours for each student for paper-based tests, with an extra 40 minutes for math, reading, and problem computer-based assessments (OECD, 2012c). The test involved a combination of both multiple-choice based questions, as well as free-response questions that required students to construct their own answers. The questions in the test were organized into passages involving a real-life scenario (OECD, 2012c). Students also completed a 30 minute background questionnaire that gave insight into their school and learning experiences, homes, and personal lives. In some countries optional questionnaires were also distributed to parents asking them to provide information on their involvement in their child's learning environment and career expectations. In addition, school principals were each given a 30-minute questionnaire covering information on the school system and educational environment (OECD, 2012c). PISA test results are used to examine how academic performance is associated with characteristics of school systems and individual schools (OECD, 2012c). OECD publications

analyze trends in variables of the learning environment, and also discuss effective policy reform efforts implemented by countries that have improved their assessment scores (OECD, 2012c).

United States Education

In the United States, students have shown no significant changes on the PISA test in math since 2003, the first year in which mathematics trends were measured. There has also been no significant change in science since 2006, and no significant changes in reading since 2000 (OECD, 2011d). The United States has remained stagnant—while other countries have pulled ahead. It is critical that you and I analyze what factors are creating positive educational outcomes in higher-performing education systems and which of these factors we have the capability of implementing in our own county before we fall further behind. The wealth of the United States means that it has the capability of spending much more on education, but we must assure that we find ways to allocate money into education in areas where it can actually make the most difference. It is logical that the best way to find these areas would be to analyze where resources are pooled in the top performing education systems.

Education Systems Around The World

The OECD has done extensive research on different educational factors of each participating country participating in the PISA study that gives me a solid foundation for my research. Along with international work created by other researchers, literature is explored discussing educational factors of each of the fifteen education systems chosen for analysis. Literature regarding each education system is examined, leading into a discussion on common denominators found. *Shanghai and Hong Kong: Learning to Learn* looks at how the education

system of Shanghai has benefited from the economic growth and how this has impacted their educational reform. This publication discusses upgrading their teaching standards, curriculum choices, and greater autonomy for local education authorities (OECD, 2012b). The section of *Lessons from PISA for Japan* titled, “Singapore: Thinking Ahead” works similarly. This publication discusses Singapore’s prevailing belief in central education systems, and the importance of building school reform on a local level through teacher leadership “*Japan: A Story of Sustained Excellence*, gives Japan’s education story—why they have always been near the top of international rankings since surveys began, their focus on instruction and strong incentives to take tough courses, as well as their system of teacher accountability (OECD, 2011c). *Finland: A non-Competitive Education for a Competitive Economy* analyzes the incredible success of Finland’s education system for the past decade, focusing on their education policies that favor informality, networking and co-operation emphasis, as well as the importance the place on strong teaching skills (OECD, 2014a).

The first middle-performing country publication I analyze is the *OECD Reviews of Evaluation and Assessment in Education: Portugal 2012*’s chapter titled, “School Education in Portugal” discussing educational practices that place them slightly below the OECD average. They explain details regarding Portugal’s curriculum, national examinations, and school infrastructure centrally run by the Ministry of Education and Science (Santiago, 2012). “Concepts, policies and practices of teacher education: an analysis of studies on teacher education in Portugal” is also useful in understanding Portugal’s education context, as it explains the guidelines for teacher education. The report argues the importance of education for social justice in Europe, and focuses on the importance of placing teachers at the center of education

reform (Pereira, 2013). Another great source on Portugal's education system for use is "First Impressions of the Reorganisation of the School network in Portugal." This article provides a retrospective on the reorganization of the school system in Portugal between 2005 and 2007, which was designed to create greater educational outcomes. It reports that teachers question the improvements to quality of teaching, as no major changes were found in Portugal for teacher-learning conditions (Ferreira & Fonseca, 2009). *Lessons from PISA for the United States* gives me a strong basis for factors that affect U.S. education including its need for high-quality teachers, high emphasis on standardized testing, and the gap that exists between low and high-income students (OECD, 2011d). "School Education in Luxembourg" from *OECD Reviews of Evaluation and Assessment in Education: Luxembourg 2012* discusses Luxembourg's highly stratified school system that contains very limited school choice for both parents and students, high incidence of grade repetition, and the problems that exist in their pedagogical structure (Shewbridge, 2012). An analysis on Hungary's education system is found in "Hungary Adopts Quality Tools For Public Education." This article lays out model created by the Hungarian Ministry of Culture and Education to "promote mutual learning by spreading best practices and enabling teachers to pass on the knowledge, skills and experiences they acquired in the field of quality improvement"(Molnar-Stadler, 2002). "The Roma/Non-Roma Test Score Gap in Hungary" documents the gap disappearance in reading between Roma and non-Roma students in 2006, once school fixed effects, health, and parenting are taken into account (Kertesi & Gaabor, 2011). "Educational disparities across regions: A multilevel analysis for Italy and Spain" will be useful in my research, as it discusses Spain's internal regional heterogeneity, and educational policy-making (Agasisti & Cordero-Ferrera, 2013). "The Education of Immigrant Youth: Some

Lessons From the U.S. and Spain” is also valuable, as it discusses the paralleled unwelcoming nature towards immigrant youth in Spain, and how this same unwelcoming nature is often parallel in the United States (Gibson & Carrasco, 2009). Grade retention in countries is also important to analyze, as is done in “Does grade retention affect students’ achievement? Some evidence from Spain.” Much of this article points to suffering effects.

My literature review on low-performing systems begins with “Decentralising education in Indonesia”, which analyses the disparities that exist in the Indonesian school system, and reports belief that there have been a number of negative consequences due to the decentralization of their education sector (Stein & Pratikno, 2006). “Education in Indonesia” is also beneficial to my research, as it gives information regarding quality of teachers, teacher absenteeism, and school local-level governance, reaching the conclusion that clear challenges lie ahead in Indonesian school reform (Yean, 2014). Information on Argentina’s education system is found in “Families, schools and primary-school learning: evidence for Argentina and Colombia in an international perspective.” This article points out a lack of performance differences between rural and urban areas of Argentina, and discusses findings that there is little relation between Argentine school performance and school resource endowments (Wößmann, 2010). “Autonomy, Participation and learning: Finds from Argentine Schools, and Implications for Decentralization” gives valuable information as well. *Education and Health Expenditure, and Development, The Cases of Indonesia and Peru*” gives educational assessments of both countries, focusing on their centralized system and that in both countries the wealthy and middle-income households benefit much stronger from educational resources than low-income households (OECD, Education and Health Expenditure, and Development: The Cases of Indonesia and Peru, 2002). “The impact of

structured teaching methods on the quality of education in Brazil” also discusses Brazil’s system. Its findings are that Portuguese schools focusing on pedagogical methods involving structuring of curriculum content and supervision of teachers outperform students not exposed to those methods (Leme, Louzano, Ponczek, & Souza, 2012). *Middle East Digest* gives great insight into one of my low-performing systems as well. The study reports results from questionnaires addressed to 74 Qatar school leaders, shedding light on the lack of local educator’s input in school reform (Education, 2012). *International Journal of Training & Development* discusses the negative impact on education from Qatar teacher’s lack of personal growth, self-reflection, and collaboration in professional development (Nasser & Romanowski, Jun2011). The journal article, “All that glitters is not gold: Challenges of teacher and school leader licensure licensing system in Qatar” gives great insight into Qatar’s education as well—also pointing out their tendency to ignore local educators’ input and lack of accounting for local Qatar culture in importing educational products (Maha, Romanowski, & Nasser, 2012).

School System Variables

I am looking for common denominators between education systems in four different areas. These areas are teacher quality, school system structure, school curriculum, and educational equality. Teacher quality is the first education variable analyzed as it is repeatedly cited as the most important schooling factor that influences student achievement (Goldhaber & Liddle, 2013). Evidence shows that specific teacher training programs prove to be differentially effective, with the differences substantial enough to greatly affect student outcomes (Goldhaber & Liddle, 2013). As research indicates that raising teacher quality is likely the policy direction

most probable to create gains in school performance, an analysis on teacher qualities that lead to positive outcomes must be made. The OECD Publication *Building a High-Quality Teaching Profession* reveals four interconnected themes with teachers: “how teachers are recruited into the profession and trained initially; how teachers are developed in service and supported; how teachers are evaluated and compensated; and how teachers are engaged in reform” (Schleicher, 2011).

For this study, each education system’s teacher quality is compared based on a variety of principals related to the four interconnected themes established by the OECD. These variables include whether or not teachers are recruited from the top pool of graduates in their region, whether teaching is considered a highly-respected position in society, if receiving a teaching position is highly selective, whether or not prospective teachers must graduate from a country’s teacher education system, whether all teachers must hold a teaching-certificate, whether teachers are required to hold a post-secondary degree to teach, whether teachers are required to have a masters degree to teach, whether the ratio of upper-secondary teachers’ salaries at the top of scale to starting salary is above or below the OECD average, and whether or not teachers are required to complete extensive professional development.

School system structure is the next variable that is used to analyze the fifteen education systems. How economies choose to distribute educational resources is an important aspect of school system structure, as explained in OECD’s *How do countries/economies allocate educational resources?* According to the OECD, school systems must balance the need for sufficient levels of resources with other demands on public spending (OECD, 2011c). School

systems often vary in how they choose to allocate their resources—from improving school buildings, providing extracurricular activities, buying new textbooks, to ensuring smaller class size (OECD, 2011c). According to OECD, there are four main groups of variables that effect school funding: student number and grade level-based, needs based, curriculum based, and school characteristics-based (Fazekas, 2012). *Ten Steps to Equity in Education* cites selection policies in schools as important system structure factors that contribute to educational outcomes as well (Field & Kuczera, 2007). The belief in this book is that differentiating students through selection pathways actually creates greater educational inequality (Field & Kuczera, 2007). The implantation of effective school leadership is cited as another key element of effective school structure (Stoll & Temperley, 2010). According to *Improving School Leadership*, by refocusing on roles that can improve school results, distributing school leadership to teams, and developing effective leaders, school outcomes can be improved (Stoll & Temperley, 2010). It also states that many school systems are stressing decentralization and school autonomy with their school governance approaches (Stoll & Temperley, 2010). Based on the literature regarding school systems and research conducted by the *OECD Education GPS Education at a Glance 2014: Full selection of indicators*, as well as the *OECD Education GPS: PISA 2012: Full selection of indicators*, each education system is compared based off whether it is funded predominantly by a central government or by state or local government, whether the expenditure on educational institutions as a percentage of GDP is higher or lower than the OECD average, whether educational goals are determined predominantly by a state and local government or a national Ministry of Education, whether or not the majority of students are in public or private schools,

and whether the education system has an academic and vocational secondary school track, or strictly academic.

Education equality is the third factor that I analyze for each school system. *How Management and Funding Relate to their Socio-economic Profile* cite socio-economic stratification in education systems is another important indicator of educational success or failure (OECD, 2012b). According to the OECD, “countries with narrow socio-economic stratification in their education systems not only maximize equity and social cohesion, but also perform well in the PISA survey” (OECD, 2012a). Based off of quantitative research provided by *OECD Education GPS Education at a Glance 2014: Full selection of indicators*, as well as *the OECD Education GPS: PISA 2012: Full selection of indicators*, each education systems’ equality is compared based on whether the student-teacher ratio among students in socio-economically disadvantaged schools is higher or lower than the teacher-student ratio among students in socio-economically advantaged schools, whether the percentage of students in the bottom quarter of the PISA index for economic, cultural, and social status who perform in the top quarter of students on PISA is above or below the OECD average, whether the percentage of immigrant students in socio-economically disadvantaged schools is above or below the OECD average, and whether or not the average PISA performances among students attending schools located in a large city has more than a 10 point difference than students attending schools in a village or rural area.

School curriculum is the fourth education variable that is used to analyze each school system. *Student Standardized Testing* works to prove standardized tests as an important factor of

school curriculum, and gives empirical research that links standardized testing to learning and teaching practices (Morris, 2011). This report also focuses on key debates on selecting appropriate test purpose, teacher evaluation based on test results, the impact of standardized testing, and minimizing strategic behavior by administrators and teachers in standardized testing (Morris, 2011). The OECD believes high quality curriculum to be a key area towards creating educational equality, so it is necessary to upgrade the subject content knowledge of teachers and implement richer curricula in teacher education programs (OECD, 2011c). *Bringing About Curriculum Innovations-Implicit Approaches in the OECD Area* discusses the belief that creating innovation in education can be explored through the decision making of what and how students are taught (Karkainen, 2012). The level of educational innovation in the classroom can be affected by who is given the freedom to actually design the curriculum.

Based on my findings, the quantitative research in the *OECD Education GPS Education at a Glance 2014: Full selection of indicators*, as well as *the OECD Education GPS: PISA 2012: Full selection of indicators*, education curriculum is compared based off of whether teachers and principals are given the responsibility of designing course content, whether principals are able to choose which textbooks are used in the classroom, whether teachers and principals establish assessment policies, whether principals and teachers decide which courses are offered in their schools, whether a national assessment is given at the upper-secondary and lower-secondary level, and whether compulsory instruction time for students is above or below average. The websites for the national organizations Teach For America and Teach For All also gives insight into highly-selective teacher recruitment models.

Hypothesis

From this study, I hypothesize that teacher quality, development, and training will have the highest correlations towards educational success. Based off of the education articles I have read, positive educational outcomes can be reached when high teacher salary and prestige level attract the most talented people into the field. By continuing to recruit the best and brightest into the teaching force, and continuing to develop their teaching skills through extensive ongoing training and development, this will be what pulls low and middle performing systems into another trajectory. In addition to teacher quality, I theorize that a belief in all children's capability to achieve to the highest levels regardless of socioeconomic background will be the other greatest determining factor of educational success. From the reports I have read on socioeconomic stratification and curriculum, I expect to find that in the most effective systems, there will be a reoccurring pattern of both high and low socioeconomic students being held accountable to the same standards and high quality of education. It is my inference that there may be many different variations in effective systems regarding how resources are pooled and tests are administered, but high teacher quality and educational equality for all will always be a common denominator for chief outcomes. Using five systems for each category is a subjective determination that gives a variety of GDP per capita and cultural contexts for each performance category. I believe that using five systems for each category will give me the opportunity to sense a strong pattern in educational factors that are correlated to positive or negative outcomes.

Methodology

PISA 2012 results are examined to begin this study. PISA 2012 ranked sixty-five countries and economies for math, science, and reading scores from highest to lowest scores. Since math, science, and reading scores were ranked separately by PISA, I combine all three subject scores together for each region to give one overall score. The scores are combined for this study to look for educational outcomes as a whole instead of results for one particular subject. Education systems are ranked by overall score from greatest to least-greatest. Shanghai, China ranks highest with a 1,733 PISA score, and Peru ranks lowest with a 1,125 PISA score. Between the highest and lowest performing systems tested, there is a 608 point score difference. The median score is Spain, ranked number 33 with a score of 1,468. The mean score is 1,425.75. As all 65 systems are listed from least to greatest, the education systems are split into three equal categories: high-performing, middle-performing, and low-performing. High-performing is considered rank number one through rank number twenty-one, middle-performing rank number twenty-two through rank number forty-two, and low-performing rank number fourth-three through rank number sixty-five. The high-performing category ranges from Shanghai, China with a 1,733 score, to the United Kingdom with a 1,507 score. The middle-performing category begins with Austria with a 1,502 score, and ends with Greece with a 1,397 score. The low-performing category starts with Turkey with a 1,386 score, and ends with Peru with a 1,125 score. Tables A, B, and C located in the Appendices show each high, middle, and low performing country's 2012 combined PISA score and 2012 Global Domestic Product per capita (GDP per capita).

Each country's 2012 GDP per capita listed from The World Bank is found to decide the high performing, middle performing, and low performing education system choices. GDP per capita is found for each region to ensure that there is a variety of different economic contexts chosen in this study. It is important to pick a few regions that are high-performing with a relatively low GDP per capita who are able to achieve high results regardless of the economic resources they may lack. It is also necessary that a few low/ middle performing regions are chosen with a relatively high GDP per capita who achieve low or middle results regardless of the top economic resources they have acquired. By ensuring high, middle, and low performing education systems are picked that deal with a variety of high and low economic contexts at each performance level, it places focus on the effects of education system characteristics on educational outcomes--opposed to the effects of regional wealth on educational outcomes.

Five high-performing, five middle-performing, and five-low performing systems are chosen to analyze once each country is listed with their GDP per capita. For the five-high performing systems, Shanghai- China, Singapore, Japan, Finland, and Canada are chosen. For middle-performing systems, Portugal, The United States, Luxembourg, Spain, and Hungary are chosen. Brazil, Argentina, Indonesia, Qatar, and Peru are the low-performing systems chosen. Appendix D lists each of the fifteen education systems included in the study along with their 2012 combined PISA score and 2012 GDP per capita.

Shanghai is selected as a high-performing choice because of the city's rise to the top since 2006. Shanghai has experienced massive pedagogical changes and educational reform that has caused it to outperform all other nations in 2012. I wish to explore exactly what these

changes are that turned out to be so revolutionary for them. Singapore is also chosen as Singapore's overall 2012 score ranks number two. Singapore has often been ranked in the top five for PISA scores and rose to its highest performance in 2012, so I am interested in what they are doing to experience continual growth. Japan is the third choice as they receive a ranking of number five for overall PISA score and have consistently ranked high over time. Japan has managed to improve their scores over Finland who once held the number one ranking, so I am curious as to what they have done to rise above competing economies. Analyzing Shanghai, Singapore, and Japan, will paint a valuable picture of education style in the high-performing Confucius circle. Finland is used as the fourth choice, ranking overall as number seven for PISA scores. Finland has dropped from the very top in 2012, as they ranked number one and number two in all subject areas in both 2003 and 2006, but regardless they have still consistently obtained incredibly high educational outcomes. Their high teacher quality and development is often discussed and reported, and this aspect of their education system is absolutely crucial for my study. Canada is the fifth choice for high-performing, ranking number 11. Although there are 10 other education systems performing better than Canada, I want to ensure I have a wide variety of cultural contexts in my high-performing systems.

The first middle-performing education system chosen is Portugal, ranking number twenty-eight in overall PISA 2012 score. With a 2012 \$20,175 GDP per capita, Portugal's economic resources rank relatively low compared to its surrounding ranks including Norway, Denmark, and the United States, with \$99,636, \$56,364, \$51,749, and \$103,858 GDPs per capita, respectively. Between 2003 and 2012, Portugal also has increased the share of top performers and reduced its share of low performers, making it an important region to analyze.

The United States is my second choice, as it is the main passion I have for this study. As discussed earlier, the American education system is failing us, and ranked as number 30 for 2012 overall PISA scores, it is crucial that we analyze what we are doing differently from higher performing systems that is causing us to fall further and further behind. The third middle performing education system to analyze is Luxembourg. Luxembourg ranks as number thirty-one for 2012 overall PISA scores, and has a \$103,858 GDP per capita—a higher GDP per capita than any other country in the study besides Liechtenstein. With top economic resources they have the capability to put extensive resources into their education system, and I am eager to see what they are lacking that is keeping them behind. Next Spain is picked, ranking as number thirty-three for their overall score. Spain is chosen as it is the country that is directly in the middle of high-performing and low-performing systems. Hungary is the last choice for middle-performing education systems, taking the spot under Spain with number thirty-four overall 2012 PISA score. Hungary is chosen because they have a \$12,560 2012 GDP per capita for 2012, which is low compared to its surrounding ranked regions. It is important to have a variety of high and low GDP per capitas in the middle ranked system studied to ensure common denominators could be found that are not directly in relation to economic constraints or freedoms.

Brazil and Argentina are chosen as the first and second low-performing education systems to analyze, ranked as number fifty-seven and sixty for 2012 PISA scores, respectively. Out of all of the lower-performing regions, I want to analyze these two as they both are in the \$11,000 GDP per capita range, while most of their surrounding ranked economies are in the \$4,000 GDP per capita range. As there are high and middle performing regions near the \$11,000 GDP per capita range such as Singapore-China, Poland, Latvia, Estonia, and Hungary, it is

important to choose low-performing regions that had similar economic backgrounds as higher-performing regions, but different educational system structures that lead to dissimilar outcomes. The third and fourth low-performing systems I chose were Indonesia and Peru, which are ranked as number sixty-three and sixty-five overall for 2012, respectively. Indonesia is chosen as it is the third worst performing education system in 2012, and Peru as it is the absolute lowest performing. It was essential that the very best, the very middle, and the very worst are analyzed, making these two regions a necessary fit. The fifth low-performing education system I chose was Qatar, which ranks as number sixty-four for 2012 overall PISA score. Qatar has a \$93,825 GDP per capita—the third highest out of all regions analyzed by PISA. Wealth does not always lead to high outcomes, so it will be interesting to analyze what they are currently doing that calls for necessary reform.

To continue this research, data is collected for each of the fifteen education systems in regards to teacher quality, school system structure, curriculum, and educational equality. Much of my research for each of these categories is completed through the search engine Business Source Premier, Academic Search Premier, and the OECD database. *Education GPS Education at a Glance 2014: Full selection of indicators* as well as *Education GPS PISA 2012: Full selection of indicators* is incredibly useful to my research in giving me quantitative findings to compare each of the fifteen systems. *Education GPS Education at a Glance 2014: Full-Selection of Indicators* contains quantitative research findings on each system under the categories of Educational Outcomes, Participation in Education, Fields of Education, Intergenerational Mobility, Resources For Education, Teachers, Classroom Environment, Economic and Social Outcomes, and Adult Competencies. *Education GPS PISA 2012: Full selection of indicators*

contains quantitative research findings on each system under the categories of Educational Outcomes, Student Performance in Mathematics, Student Performance in Reading, Student Performance in Science, Student Performance in Problem Solving, Financial Literacy, Participation in Education, Resources for Education, Classroom Environment, Student Engagement, Drive, and Self-Beliefs, Performance and Socio-Economic Status, Performance and Diversity, and Governance.

Each category in the Education GPS is sifted through to look for quantitative information that related to education curriculum, school system structure, education equality, and teacher quality. For education system structure, comparable data is found on whether the expenditure on educational institutions as a percentage of GDP is higher or lower than the OECD average. For education curriculum, data is found on the percentage of teachers and principals that are given the responsibility of designing course content, the percentage of principals and teachers who are able to choose which textbooks are used in the classroom, the percentage of teachers and principals who establish assessment policies, the percentage of principals and teachers who decide which courses are offered in their schools, whether a national assessment is given at the upper-secondary and lower-secondary level, and whether compulsory instruction time for students is above or below the average OECD time.

For teacher quality quantitative data measuring the respect level of teachers in different countries is found, as well as the ratio of upper secondary teachers' salaries at the top of scale to starting scale. For educational equality, the Education GPS gives quantitative information on student-teacher ratio among students in socio-economically disadvantaged schools versus

teacher-student ratio among students in socio-economically advantaged schools, percentage of students in the bottom quarter of the PISA index for economic, cultural, and social status who perform in the top quarter of students on PISA, percentage of immigrant students in socio-economically disadvantaged schools, and whether or not the average PISA performances among students attending schools located in a large city has more than a 10 point difference than students attending schools in a village or rural area.

Information for the other variables chosen comes from literature in the search engines Business Search Premier, Academic Search Premier, and the OECD database. For education system structure, information is collected on whether each system is funded predominantly by a central government or by a state or local government, whether education goals are determined predominantly by state and local governments or a national Ministry of Education, and whether students are able to enter an academic or vocational secondary track, or strictly academic. For teacher quality, additional information is collected on the respect level of teaching in society, whether teachers are recruited from the top-pool of graduates in a country, teaching position selectivity, whether teachers must graduate from a country's teacher education system, whether teachers must hold a teaching certificate, degree requirements for teachers, and professional development requirements for teachers.

Information for each sub-category under the four main education variables is entered into a chart comparing each of the fifteen systems. The chart comparing each system's curriculum is found as Appendix Figure E. The chart comparing each system's structure is found as Appendix

Figure F. The chart comparing each system's educational equality is found as Appendix Figure

G. The chart comparing each system's teacher quality is found as Appendix Figure H.

Findings

Curriculum

Curriculum Variables, or Figure E, is the first chart analyzed in this study. For the category “principals and teachers report that they have responsibility for the task of determining course content”, three high-performing countries and two low-performing systems rank above 50% while the rest ranked below 50%. For the high-performing systems, Shanghai ranks at 50.1%, Singapore ranks at 95.5%, Japan ranks at 17.3%, Finland ranks at 45.8% and Canada ranks at 82.3%. For the middle-performing systems, Portugal ranks 5.9%, the United States ranks at 15.4%, Luxemburg ranks at 4.8%, Spain ranks at 25.5%, and Hungary ranks at 26.8%. For the low performing systems, Brazil ranks at 29.6%, Argentina ranks at 23.8%, Indonesia ranks at 73.4%, Qatar ranks at 10.5%, and Peru ranks at 52.7% (OECD Education GPS). Because three high and two low performing countries both grant high autonomy to teachers and principals to determine course content, this factor alone does not appear to have a high correlation towards outcomes—although high-performing systems do appear to have a higher tendency to grant course content autonomy.

For the category “ principals and teachers report they are given the responsibility of choosing which textbooks are used in the classroom”, two high-performing, three middle-performing, and one low-performing country rank above 50%, while three high-performing, two middle-performing, and four low-performing rank below 50%. For the high-performing systems, Shanghai ranks at 20.7%, Singapore ranks at 26.1%, Japan ranks at 88.8%, Finland ranks at 88.6%, and Canada ranks at 44.2%. For the middle-performing systems, Portugal ranks at 79.2%,

the United States ranks at 25%, Luxembourg ranks at 17.5%, Spain ranks at 79.7%, and the United States ranks at 25%. For low-performing systems, Brazil is ranked at 29.6%, Argentina is ranked at 23.8%, Indonesia is ranked at 73.4%, Qatar is ranked at 10.5%, and Peru is ranked at 52.7% (OECD Education GPS). Textbook autonomy for teachers and principals appears to vary for each performance category, and does not appear to be correlated with outcomes.

For the category “teachers and principals report that they believe they have considerable responsibility for establishing assessment policies” only two high-performing countries and three low-performing countries rank above 50%. Three high-performing, five middle-performing, and two low-performing systems rank below 50% in this category. For high-performing systems, Shanghai ranks at 25.4%, Singapore ranks at 16.6%, Japan ranks at 97.7%, Finland ranks at 50.4%, and Canada ranks at 25%. For middle-performing systems, Portugal ranks at 17.7%, the United States ranks at 15.6%, Luxembourg ranks at 6.2%, Spain ranks at 16.6%, and Hungary ranks at 34.9%. For low-performing systems, Brazil ranks at 20.3%, Argentina ranks at 59.4%, Indonesia ranks at 82.1%, Qatar ranks at 5.3%, and Peru ranks at 59.3% (OECD Education GPS). Because the majority of both high and low performing systems do not give teachers and principals high responsibility for establishing assessment policies, assessment autonomy does not seem to have a correlation with outcomes.

For the category “principals and teachers reporting they are given the responsibility of deciding which courses are offered in their schools”, the majority of high, middle, and low performing systems give teachers and principals believe they are given course decision autonomy. Only two high-performing, one middle-performing, and two low-performing systems

do not. For high-performing systems, Shanghai ranks at 50.1%, Singapore ranks at 95.5%, Japan ranks at 17.3%, Finland ranks at 45.8%, and Canada ranks at 82.3%. For middle-performing systems, Portugal ranks at 85%, the United States ranks at 93.6%, Luxembourg ranks at 74.2%, Spain ranks at 44%, and Hungary ranks at 78.5%. For the low-performing systems, Brazil ranks at 83.2%, Argentina ranks at 22.3%, Indonesia ranks at 69.0%, Qatar ranks at 82.6%, and Peru ranks at 40.9% (OECD Education GPS). Because course decisions are granted to the majority of teachers and principals in all three-performance categories, it does not seem to have a strong correlation with outcomes.

Out of all five high-performing systems, none of them have a national assessment that is given to them at the upper-secondary level. For Canada, some schools are given a national assessment and some are not (OECD Education GPS). Two middle-performing countries give a national assessment at the upper-secondary level, while three low-performing countries do. Argentina uses a national assessment sometimes, depending on the school. It appears that national assessments at the upper-secondary level are more of a trait for middle and low-performing systems than a trait for high-performing systems.

National Assessments at the lower-secondary level are administered by three high-performing countries, three middle performing countries, and three low-performing countries (OECD Education GPS). For Canada and Argentina, it again varies depending on the school. Because national assessments are a trait that many high-performing, middle, and low-performing systems administer, it does not seem to be a factor that sets a system up for success or failure.

For the category, “Compulsory instruction time for students”, research is not collected by the OECD for Shanghai, Singapore, or all five low-performing systems. Out of the remaining seven systems that do have data available, two high-performing systems and two middle performing systems have instruction time that was below the OECD average (794 hours a year), while two high-performing and three middle-performing systems have instruction time that was above the OECD average (OECD Education GPS). For the high-performing systems, Finland completes 632 hours, Canada completes 919 hours, and Japan completes 762 hours. For the middle-performing systems, the United States completes 967 hours, Hungary completes 616 hours, Portugal completes 806 hours, Spain completes 787 hours, and Luxembourg completes 924 hours (OECD Education GPS). Because instruction time is varied throughout each performance level, there does not appear to be a high-correlation between performance level and instruction time.

Based off of the findings in the curriculum chart, the only variable that appears to have a correlation with high-performance is avoiding a national assessment at the upper-secondary level. However, as Peru also does not administer a national assessment—nor does Portugal and Luxembourg—the correlation with high-performance does not appear to be particularly strong. The data collected on curriculum as seen in Figure E leads me to believe that there is not a high-correlation between educational outcomes and the curriculum sub-categories analyzed in this study.

Education Structure

Education Structure, or Figure F, is the second chart analyzed in this study. Only Singapore and Qatar are found to receive funds predominantly by the central government, while Shanghai, Canada, Portugal, Spain and Hungary receive funds predominantly by the state or local government. Japan, Finland, the United States, Luxembourg, Brazil, Argentina, Indonesia, and Peru receive funds by a combination of the central and local government. Analyzing these systems in their performance level groups, only one high-performing system receives funds by the central government, as does one low-performing system. Three high-performing systems receive funds predominantly by the state or local government, as do two middle-performing systems. Two high-performing systems receive funds by a combination of central and local government, as does two middle-performing systems, and four low-performing systems. Funding methods are extremely varied for each performance category and does not appear to have a high correlation with educational outcomes.

For the category “expenditure on educational institutions as a percentage of GDP”, two high-performing, one-middle performing, and one low-performing system ranks above the OECD average of 6.1% (OECD Education GPS). Three high-performing, 4 middle-performing, and four low-performing systems ranks below the OECD average of 6.1%. Shanghai expenditure on educational institutions as a percentage of GDP ranks at 5.1%, while Singapore ranks at 3.2%, Japan at 5.1%, Finland at 6.5%, and Canada at 6.8% (OECD Education GPS). Portugal’s expenditure on educational institutions as a percentage of GDP ranks at 5.5%, while the United States ranks at 6.9%, Luxembourg at 3.2%, Hungary at 4.4%, and Spain at 5.5% (Education GPS). Brazil’s expenditure on educational institutions as a percentage of GDP ranks at 5.9%, while Argentina ranks at 7.2%, Indonesia at 3.6%, Qatar at 4.1%, and Peru at 2.8% (OECD

Education GPS). Level of funding does not appear to have a correlation with performance outcomes, as two high-performing, one middle-performing system and one low-performing system spend a higher percentage of GDP on educational institutions than other education systems. Shanghai, Singapore, and Portugal spend below the OECD average for percentage of GDP invested in educational institutions and still maintain top-outcomes.

One high-performing, two middle-performing, and one low-performing system has its education goals determined predominantly by the state or local government, while four high-performing, three middle-performing, and four low-performing systems has a national set of education goals determined by a Ministry of Education. Systems with education goals determined predominantly by the state or local government include Canada, Spain, Hungary, and Indonesia. Systems with national education goals include Shanghai, Singapore, Japan, Finland, Portugal, United States, Luxembourg, Brazil, Argentina, Qatar, and Peru. The majority of high, middle, and low-performing systems each have a national set of education goals—so this itself does not seem to have a high correlation with educational outcomes. It appears that sometimes a national standard works well, while sometimes it does not.

All fifteen systems that are analyzed for this study have the majority of students enrolled in government or public schools instead of independent private schools. Having the majority of students enrolled in public schools does not appear to set other system's performance above or below one another.

Four high-performing, two middle-performing, and four low-performing systems have both academic and vocational secondary school tracks, while one high-performing, three-middle

performing, and one low-performing system do not. Shanghai, Singapore, Japan, Finland, Portugal, Hungary, Brazil, Argentina, Indonesia, and Qatar have both academic and secondary tracks while Canada, United States, Luxembourg, and Peru only offer an academic secondary track. While the majority of high-performing systems offer both academic and vocational tracks, so do the majority of low-performing systems. Tracking option choices do not appear to indicate educational outcomes. The data collected on curriculum as seen in Figure G leads me to believe that there is not a high-correlation between educational outcomes and any of the education structure sub-categories analyzed in this study.

Education Equality

Education equality, or Figure G, is the next chart analyzed for this study. It is found that the student-teacher ratio among students in socio-economically disadvantaged schools is higher than the student-teacher ratio among students in socio-economically advantaged schools in only one high-performing system. The student-teacher ratio is also higher for disadvantaged schools in two-middle performing systems, and two low-performing systems. The student teacher-ratio among students in socio-economically disadvantaged schools is lower than the ratio among students in socio-economically advantaged schools in four high-performing systems, three middle-performing systems, and three low-performing systems. Shanghai has a 10.51 student-teacher ratio in economically advanced schools versus a 14.68 student-teacher ratio in economically disadvantaged schools. Singapore has a 15.94 student-teacher ratio in advanced schools, compared with a 14.02 ratio in disadvantaged schools. Japan has a 13.03 student-teacher ratio in advantaged schools, versus a 9.96 Finland has a 11.44 student-teacher ratio in

advantaged schools, compared with a 9.19 student-teacher ratio in disadvantaged schools. Canada has a 16.93 student-teacher ratio in advantaged schools versus a 14.71 student-teacher ratio in disadvantaged schools (OECD Education GPS). Portugal has a 10.45 student-teacher ratio in advantaged schools, compared with a 7.80 student-teacher ratio in disadvantaged schools. The United States has a 18.48 student-teacher ratio in advantaged schools compared to a 16.77 student-teacher ratio in disadvantaged schools. Luxembourg has a 9.28 student-teacher ratio in advantaged schools, versus a 9.00 student-teacher ratio in disadvantaged schools. Spain has a 14.66 student-teacher ratio in advantaged schools compared with a 11.68 student-teacher ratio in disadvantaged schools. Hungary has a 10.45 student-teacher ratio in advantaged schools, versus a 13.42 student-teacher ratio in disadvantaged schools (OECD Education GPS). Brazil has a 22.93 student-teacher ratio in advantaged schools, compared with a 31.27 student-teacher ratio in disadvantaged schools. Argentina has a 11.27 student-teacher ratio in advantaged schools versus a 9.55 student-teacher ratio in disadvantaged schools. Indonesia has a 16.72 student-teacher ratio in advantaged schools, versus a 17.92 student-teacher ratio in disadvantaged schools. Qatar has a 16.00 student-teacher in advantaged schools, versus a 12.48 student-teacher ratio in disadvantaged schools. Peru has a 20.13 student-teacher ratio in advantaged schools versus a 17.01 student-teacher ratio in disadvantaged schools (Education GPS). It appears that having a higher student-teacher ratio in advantaged schools than in disadvantaged schools is more of a common characteristic for higher-performing systems. However three low-performing systems also have a higher student-teacher ratio in their advantaged schools than they have in their disadvantaged schools. While this trait is one that is more common in high-performing systems, it does not appear to have a high-correlation with outcomes.

For the category “percentage of students in the bottom-quarter of PISA index for economic, cultural, and social status who perform in the top-quarter of students on PISA”, all five high-performing systems rank above the OECD average of 6.38%. Only one middle-performing system, Spain, also ranks above the OECD average. The remaining middle-and low-performing systems rank below the OECD average of 6.38%. For the high-performing systems, Shanghai ranks at 19.20%, Singapore ranks at 15.06%, Japan ranked at 11.29%, Finland ranks at 8.13%, and Canada ranks at 8.30% (OECD Education GPS). For the middle-performing systems, Portugal ranks at 7.68%, the United States ranks at 5.17%, Luxembourg ranks at 6.10%, Spain ranks at 6.40%, and Hungary ranks at 4.08% (OECD Education GPS). For the low-performing systems, Brazil ranks at 1.75%, Argentina ranks at 1.06%, Indonesia ranks at 2.55%, Qatar ranks at 0.44%, and Peru ranks at 0.52% (OECD Education GPS). There is a very strong correlation between a system’s education performance and disadvantaged student performance. It appears that the more often students from low-economic, cultural, and economic status are able to perform exceedingly well on the PISA test, the higher the educational outcomes for the system as a whole. Performance results of students in low socio-economic status seem to be the first high-correlation towards educational outcomes.

For the category “percentage of immigrant students in socio-economically disadvantaged schools”, Canada is the only high-performing system that ranks above the 6.38% OECD average (OECD Education GPS). Two middle-performing systems and one low-performing system also rank above the OECD average. Four high-performing, three middle-performing, and four low-performing systems rank below the OECD average. Shanghai only has 2% of their immigrant students in socio-economically disadvantaged schools, while Singapore has 15%, Japan has

0.5%, Finland has 4.8%, and Canada has 38.9% (OECD Education GPS). Out of the middle-performing systems, Portugal ranks at 6.7%, the United States ranks 40%, Luxembourg ranks at 58%, Spain ranks at 13.3%, and Hungary ranks at 0.6% (OECD Education GPS). For the low-performing systems, Brazil ranks at 0.5%, Argentina ranks at 6.6%, Indonesia ranks at .1%, Qatar ranks at 52.4%, and Peru ranks at .7% (OECD Education GPS). The amount of immigrants in disadvantaged schools is substantially varied throughout the three performance levels, and does not appear to have a high-correlation towards educational outcomes (OECD Education GPS).

The data collection on educational equity as seen in Figure H leads me to believe that there is a high-correlation between educational outcomes and the performance results of students in low socio-economic status. What now needs to be discussed in greater depth is what high-performing systems specifically seem to do to ensure top-outcomes from their low-socio economic students in comparison with the middle-and low-performing systems. In order for middle and low-performing systems to improve results for their low socio-economic status students, we must analyze what works with the top-performing systems, versus what seems to be less effective.

Education of students in low socio-economic status

An important aspect of Shanghai's education system is the ability of teachers to handle teaching children of diverse backgrounds and abilities (OECD, 2012b). As diversity and disparity in schools are typical features of Shanghai schools, they work to ensure equal opportunity between students (OECD, 2012b). In the 1980s migrant workers came from rural

villages to more urban areas. Some work on construction sites while others are low-wage laborers (OECD, 2012b). Because of Shanghai's active commercial economies, Shanghai has a huge population of migrant children. In 2006 21.4 % of migrant children were school age (OECD, 2012b). The OECD states that Shanghai has developed the notion that "migrant children are our children" and work to include them equally in their educational development (OECD, 2012b). The former Deputy Director of Shanghai Academy of Education Research states, "Shanghai has historically always been a city of migrants. Children of the migrants today will stay on and become bonafide citizens of Shanghai. How they are treated today will determine how they feel towards and contribute to the future of Shanghai (OECD, 2012b).

In Singapore, the general belief is that it is an education system's duty to nurture every child regardless of their achievement level or ability (OECD, 2012c). Housing and schools are deliberately ethnically mixed in Singapore to combat racial discrimination (OECD, 2012c). An important goal for Singapore has been to make sure that ethnic and religious rivalries do not exist that hinder the development of their society as a whole (OECD, 2012c). It was decided that schools would be the gateway to ensuring all students were given the tools they needed to succeed regardless of their socioeconomic status (OECD, 2012c). Singapore achieves this by ensuring that every school has a share of the best teachers, and specifically gives these teachers to struggling students (OECD, 2012c). Another important aspect of educational equality in Singapore is the focus that is given to lower-level achievers (OECD, 2012c). They embrace that students can sometimes be "late bloomers" and allow their students to move horizontally between secondary level education streams (OECD, 2012c).

The belief in Japan is that all teachers can learn to the highest standards. They do not give in to a diluted curriculum, to ensure students are achieving at the highest levels (OECD, 2011c). Classes in Japan are heterogeneous—they are not any students that are held back in easier classes or given higher-level classes based off of their perceived ability (OECD, 2011c). Their system is designed in such a way to “achieve the greatest good for the greatest number” (OECD, 2011c). By keeping all students in the same class level, high-achieving students are able to assist lower-achieving students within the classroom (OECD, 2011c). Research shows that this helps both the tutee and the tutor, as the tutor learns nearly as much by simply engaging in the tutoring process itself (OECD, 2011c). Prefectures also reassign Japanese teachers and principals to different schools to make sure that there is an even distribution of the highest-performing teachers (OECD, 2011c). Transfers are administered every few years to make sure that the same people are not in the same school all the time (OECD, 2011c).

According to the OECD, “equality in educational opportunities lies at the heart of Finland's education policy (OECD, 2014a). The goal is for all children to have a neighborhood school that sufficiently serves the needs of that student. Regardless, parents are still able to choose any school they would like their child to attend in their own municipality (OECD, 2014a). Students in Finland are brought into the same schools coming from very different life circumstances and life goals. Finland’s equal opportunity principle insists that all students must be given equal chances in school for success (OECD, 2014a). Student welfare teams are also formed at each school and meet twice a month to discuss the well-being of specific children in their school (OECD, 2014a). Teachers achieve equality under a peruksoulu method, in which they believe that schools should function as small-scale democracies, and that all children are

capable of learning if given the proper support (OECD, 2014a). Teachers design learning environments that enables pupils to have differentiated learning to meet their individual needs (OECD, 2014a).

In Canada, a focus on educational equity is also key. The federal government is responsible for funding and encouraging the education of the indigenous people of Canada (Top Performing Countries). They have made it their mission to establish education in the official minority language in each province to ensure equal educational opportunity is given to indigenous people (Top Performing Countries). Canada also works on identifying potential dropouts and provides early intervention and help they need to be successful. With drop-out intervention and a concentration on low-performing students, high school graduation rates went from 68% in 2003 to 82% in 2013 (Top Performing Countries). From PISA 2012, variation in math performance as explained by socioeconomic background was 9.4%, in comparison with a 14.8% OECD average (Top Performing Countries).

The number of immigrants in Portugal has increased dramatically, contributing to their educational inequality (Santiago, 2012). In 2009, upper-secondary graduation rates were 63% , with the rest of students leaving the school system with low skills (Santiago,2012). A large percentage of the population has a low-appreciation for educational attainment that likely result from their parents' own low educational attainment and unskilled-jobs that are available (Santiago,2012). Special attention to immigrant and low-socio economic students does not appear present.

Low socio-economic status in the United States has a higher correlation to poor educational performance than most other countries (OECD, 2011d). Many tend to believe that the reason the United States is not a top-education performer is because the U.S. is so diverse socio-economically or demographically. The OECD states that “many countries with equal or higher proportions of immigrant students and non-native speakers of local language are outperforming the United States and show a more moderate relationship between socio economic background and learning outcomes” (OECD,2011d). The only OECD countries where socio-economic background shows a greater impact on reading performance than the United States is Hungary, Belgium, Luxembourg, Germany, Chile, and Turkey (OECD,2011d). In the United States, the highest-quality teachers are often absent from low-income schools. Low socio-economic neighborhoods very often end up feed into low-performing schools with a low-quality teaching force. A general belief that all children are capable of achieving at the highest-levels is not often present in America.

Luxembourg has a very large education gap plaguing its education system. On the 2012 PISA test, advantaged Luxembourgish students outperformed least-advantaged students by 115 score points (Shewbridge, 2012). Fundamental education is taught in German while French is gradually introduced into secondary education, which poses as an extra obstacle to students who are from an immigrant background (Shewbridge, 2012). Luxembourg also has a highly stratified system. In the 2009-2010 school year, 81.4% of the secondary general education track was made up of native Luxembourgish, where natives only made up 57.5% of secondary technical education (Shewbridge,2012). The stratified system between students of high and low socio-economic status contributes greatly to students’ success and performance (Shewbridge,2012).

High divergences in test scores are very present among different regions in Spain (Agasisti, 2013). It is cited that education differences has a high impact on economic inequality at regional levels (Agasisti, 2013). Some students from Spanish regions actually perform just as well as students from education systems ranking at the top of PISA assessments, but the vast inequality in schools that exists pulls Spain education ranking down (Agasisti, 2013).

Hungary deals with a large educational equality gap between Roma and non-Roma students. The Romani people are one of the largest and poorest ethnic minority groups in Europe and comprise between 10 and 12 percent of the adolescent population in Hungary (Molnar-Stadler, 2002). Throughout history, the lives of the Roma have been branded by exclusion (Molnar-Stadler, 2002). It is believed that the gap between the Roma and non-Roma students is due to differences in health, parenting, and schools (Molnar-Stadler, 2002). It does not appear that measures are taken to give Romani students the support they may need (Molnar-Stadler, 2002).

In Brazil, education is typically made up of free, public low-quality education, or private higher-quality education (Belluzzo & Pazello, 2013). Students are only able to enroll in private schools if their family is able to pay the tuition fees (Belluza & Pazello, 2013). Often, the ability to receive a higher-quality education in Brazil is based off of income (Belluza & Pazello, 2013). The parents of students in low-performing public schools have received little education themselves-often less than four years of schooling themselves (Beluza & Pazello, 2013). By having low-income students enroll in low-income schools, a large education gap continues to exist in Brazil.

Very little specific education gap information exists regarding Argentina or Qatar. But research conducted by the OECD that only 1.06% of low socio-economic students in Argentina and 2.55% percentage of low socio-economic students in Qatar perform at the top of their systems PISA scores indicate that the gap does exist (OECD Education GPS). 52.4% of immigrant students in Qatar are also placed in disadvantaged schools (OECD Education GPS).

In Indonesia, social and geographical disparities are high and seem to be increasing (Stein & Pratikno, 2006). Differences in education investment in rural and urban areas have become extremely prominent through decentralization, forcing many students from poor and rural families to deal with poor educational quality (Stein & Pratikno, 2006). In many sub-districts of Indonesia, model schools are being built, causing a sharp contrast between the new schools and neighboring worn down ones (Stein & Pratikno, 2006). Tuition fees are extremely high for the model schools, creating educational dominance of the elite (Stein & Pratikno, 2006). As one Indonesia school principal expressed, “Don’t you ever think that the education sector is free from corruption” (Stein & Pratikno, 2006). The cost of education for children of rural and poor families is often too much for families to handle (Stein & Pratikno, 2006). Out of the poorest half of households, school costs can make-up up to 40% of total family expenditures (Stein & Pratikno, 2006).

There is a huge grade repetition and drop-out rate among indigenous children in Peru (Ames). A very low-quality of educational inputs are offered to indigenous children in schools (Ames). Schools serving indigenous children in Peru often have inadequate infrastructure, a lack of equipment and educational materials, as well as other resources (Ames). Educational

assessment results among indigenous children are extremely low. At the primary level, only 6 percent of indigenous Quechua children perform at grade level for reading comprehension, and only 19.2% in math (Ames). It appears that disadvantages given to ingenious children are incredibly deepened without the ability to take classes in their own language, without their own culture being taken into account in the classroom, and without access to schools of high-quality (Ames).

Teacher Quality

Teacher Quality, or Figure H, is the last chart analyzed for this study. All five-high performing systems fall into the category “teachers are recruited from the top pool of graduates.” None of the middle or low performing systems fall into this category. Shanghai, Singapore, Japan, Finland, and Canada are all repeatedly cited for recruiting from the top cohort of their graduating classes, while none of the middle or low performing systems are cited as holding the same high-level of qualifications for their teaching force. In Shanghai, education programs are able to recruit from the top pool of graduates because teaching has moved up as a preferred occupation (OECD, 2012b). Because universities allow priority admission to teacher candidates, teacher programs often have the first choice of the best students. Teachers have a more stable income than many other professions, making it a top choice for great students (OECD, 2012b). Similarly, in Singapore, prospective teachers are selected from the top one-third of the secondary graduating class by panels of school officials (OECD, 2012c). Japan recruits top students as well, as teaching is seen as a highly desirable job (OECD, 2011c). Only the best and brightest are able to become teaching professionals in Finland (OECD, 2014a). In 2011 the University of Helsinki

received 2,300 applications for 120 spots in their primary teacher education programme (OECD, 2014a). Teacher quality in Canada too begins by selecting from a top cohort of individuals. The majority of prospective teachers are drawn from the top 30% of their college peers (Top Performing Countries).

In Portugal, it does not appear that they set qualifications that ensures top-students enter the field of teaching. In the United States, students often see teaching as more if a blue-collar based occupation rather than a knowledge-based profession, often deterring top graduates from pursuing a job in teaching (OECD, 2011d). Research shows that in 2000 the likelihood of a teacher having been among the highest scoring ten percent of high school students in the United States was only at 11 percent (Portuguesa, 2000). No qualifications are found for Luxembourg, Spain, and Hungary that ensure they recruit the most talented cohort of students into their education programs, either. Brazil, like many systems, has difficulty recruiting top-graduates into the field of teaching because of low-teacher pay level. In Maranhao, Brazil, many primary-school teachers must find a second job to earn a living. Less-skilled, higher paying jobs are common in the region, making teaching a less attractive profession (Principles, Aims and Objectives). No qualifications are found for Argentina, Indonesia, Qatar, and Peru that ensure they have top-graduating students entering the field of teaching. In addition, teacher shortages are a common problem in the low and middle performing systems studied, creating a system that strives to get teachers into the classroom to fill vacancies regardless of their education and background. Specific quantitative data does not exist for the middle and low performing systems stating what percentage of top-performing students enter the field of teaching. However, it is a reasonable assumption that without specific controls to manage an outcome, those outcomes

typically fall into a normal distribution. Without specific goals and measures in place explicitly targeting that a system recruits teachers from a top-cohort of graduates, it is highly unlikely that they achieve it. Based off of findings with Shanghai, Singapore, Japan, Finland, and Canada, ensuring the teaching force is recruited from the top pool of graduates appears to have a high-correlation with high-performance outcomes.

All five-high performing systems also fall into the category “teaching is considered a highly respected position in society.” None of the middle or low performing systems fall into this category. The OECD measured the percentage of teachers from various systems who believe that the teaching profession is valued in society, with the average being 25.2% (OECD Education GPS). Shanghai and Canada were not measured by the OECD for this study, but Singapore, Finland, and Japan all ranked above the OECD average. 67.6% of teachers in Singapore believe that the teaching profession is valued in society, as does 58.6% of Finland teachers and 28.1% of Japanese teachers (OECD Education GPS). In regular opinion polls given to young Finnish students, teaching consistently ranks as the most admired profession (OECD, 2014a). Although Japan ranks above the OECD average, the percentage may still seem low compared to other top-systems. It is reasonable to guess that teachers themselves may view themselves differently than society as a whole. According to the OECD, as Confucian tradition, great honor is given to the teacher (OECD, 2011c). Since the modern era began schools have been staffed with members of the upper class, making teaching a desirable occupation in Japan (OECD, 2011c). It is considered a great honor to be a teacher in Singapore as it is seen as a competitive and well-regarded occupation (OECD, 2012d). Shanghai and Canada are repeatedly cited for the high-level of teacher respect in society, as is seen in literature analyzed for this study. In Shanghai,

teaching is a highly-respected position because top graduates make up the teaching force. The qualifications to become a teacher are high and include a steady income, so the career is held to a high regard (OECD, 2012c). Canada shares these same beliefs about teachers. Because teacher education programs are thought to be academically rigorous, society holds great-respect for the profession (Top Performing Countries).

The OECD measured the teacher-respect level of two of the middle-performing systems analyzed in this study— Portugal ranks at 10.5%, while Spain ranks at 8.5% (OECD Education GPS). Literature that is studied for this research appears to point in the direction that teacher-respect level is not high in the United States, Hungary, or Luxembourg. The United States seems to have a low-respect level for teaching because society perceives it as an easy occupation to get into. Because of its perceived easiness, there seems to be a general notion that teachers could not get into more demanding occupations (OECD, 201d). There is not any scholarly research available that cites Luxembourg's teacher-respect level being particularly strong. In Hungary, teacher respect-level is cited as being low due to the low financial earnings (Dobos & Vasarhelyi, 2011). This causes many teachers to leave the profession (Dobos & Vasarhelyi, 2011). The OECD only measured the teacher-respect level of one of my low-performing systems. Teacher-respect level in Brazil ranks at 12.6% (OECD Education GPS). There is not scholarly research that points to the direction that the respect-level held by teachers in Argentina, Peru, Indonesia, and Qatar is high either. Qualification, responsibility, and experience often separate occupations with low-level of prestige from occupations with high levels of prestige. If high-qualifications are not present, a high-level of respect is unlikely to be present as well. Based on data regarding Shanghai, Singapore, Japan, Finland, and Canada, it appears that the level of

respect held in society for teaching appears also have a high-correlation with educational performance.

The next category for teacher quality is whether or not receiving a teaching position is a highly-selective process. Receiving a teaching position is highly-selective for all five-top performing systems analyzed in this study. In Shanghai, prospective teachers must take rigorous examinations in the areas of pedagogy, psychology, teaching ability, and teaching methods to ensure that they pass the necessary qualifications to be a successful educator (Top Performing Countries). The high-level of students recruited mixed with the rigorous teacher testing makes for a selective process. Becoming a teacher in Singapore is highly selective as well—students complete an education program that ensures a strong focus on pedagogical content and synergies among modules within the program (OECD, 2012c). Strong selectivity of teachers in Singapore begins from the initial recruitment. Because student admittance into teacher education program is so selective, students receive perks while undergoing their education. Prospective teachers receive a monthly stipend competitive with the monthly salary for graduates of other fields to ensure the highly-selected students wish to complete the program (OECD, 2012c). Japan is highly selective as well. Because teaching is held to such a high regard, they receive numerous applicants. For every teaching position held in Japan, there are seven applicants (OECD, 2012c). Becoming a teacher in Finland is a competitive and selective process. After passing a rigorous national Matriculation exam, successful candidates have to not only have the best scores, but prove themselves to have the best interpersonal skills (OECD, 2014a). Every year, about one out of every ten applicants will be accepted to study to become a teacher in a Finnish primary school. Around 5,000 teachers are selected each year among 20,000 applicants (OECD, 2014a).

Canadian teacher education programs are also highly-selective, as is stated by the Center On International Education Benchmarking (Top Performing Countries).

Receiving a teaching position is not seen as a highly-selective process for any of the middle and low-performing systems analyzed. In Portugal, there are not any specific policies for access to teacher education programmes. Training institutions are then given the responsibility of setting admittance requirements (Portuguesa, 2000). There is not any literature that cites their training programs as particularly selective or competitive. In the United States, education programs do not have a reputation of being particularly difficult to be admitted into. As the OECD discusses, the bar has not yet been set that detours students with poor qualifications from entering education programs in the United States (OECD, 2011d). Luxembourg uses a system known as “open recruitment” to select teachers for schools (Key Data on Teachers and School Leaders in Europe). During open recruitment, teachers seeking employment are matched with available teaching posts (Key Data on Teachers and School Leaders in Europe). It is not cited as a competitive or selective. Competitive examinations are given for prospective teachers at the secondary level however, which includes an examination phase assessing mastery of teaching techniques, merit-based selection phase assessing suitability of candidate based on education background and teaching experience, and a probationary period in which candidates demonstrate their teaching aptitude (Key Data on Teachers and School Leaders in Europe). Although this system is seen as competitive, it is not cited as being selective. Spain organizes the same system of competitive examinations as well (Key Data on Teachers and School Leaders in Europe). The state regulates basic requirements for students entering the teaching profession, but the individual communities are in charge of organizing their own merit-based selection and

competitive examinations to fit their own standards (Key Data on Teachers and School Leaders in Europe). Again, although this is a competitive process, it is not cited as having high standards to meet qualifications. Teacher shortages are cited to be a problem in Hungary, so it does not appear that they can afford to be highly-selective with their prospective teachers.

Brazil does not have a high-level teacher selectivity process, either. It is cited that in Maranhoe, there are 50,000 primary-school teachers that are lacking degrees. It is believed that this is beyond the capabilities of the three local universities to control or fix (Luis, 2000). In Argentina, teachers are trained in a variety of different capacities included provincial, technical, and private institutions and universities (Argentina-Teaching Profession). Even so, many teachers in the classroom have not been through a teacher-training school, confirming that they are not currently being highly-selective with their teacher choices. Qualified teachers are often in high-demand in Argentina, especially in remote regions (Argentina-Teaching Profession). Indonesia teachers are required to have a bachelor's degree and teacher certification based Teacher Law 2005, but because they have been working to ensure all teachers meet minimum credentials, their process does not appear to be competitive or selective (Supriatna). In Qatar, the Supreme Education Council reports that up to 31 percent of teachers in the Gulf State have no formal qualifications, therefor having a low-selective process (Ferris-Lay, 2011). While it appears that Peru has a large number of qualified teachers of higher institutes of pedagogy or universities, there is not any literature that indicates the process to receive a teaching position is a selective procedure (Education in Peru: History, Current Systems, and Equity).

It appears that most middle and low-performing systems are placing a higher emphasis on ensuring they can get teachers who meet teacher certification laws into their classroom, rather than focusing on further selection measures beyond certification. Middle and low-performing systems are working to fill vacancies, rather than filling their schools with teachers that have met highly-selective measures. Based off of this contrast from Shanghai, Singapore, Japan, Finland, and Canada, it appears that the selectivity-level of teaching positions is a high-indicator of educational outcomes.

Whether or not prospective teachers must graduate from a country's teacher education program is the next category analyzed. All five high-performing systems require all prospective teachers to graduate from a country's teacher-education program, as do two middle-performing systems and one low-performing system. The remaining three middle-performing and four low-performing systems do not require all prospective teachers to graduate from a teacher education program. In Shanghai, in-service College of Education was merged into normal universities with sub degree diploma earnings necessary for primary schools and degree earnings necessary for secondary schools. In Singapore, all teachers receive their training at the National Institute of Education at Nanyang Technological University (NIE) (OECD, 2012c). Depending on their level of education when they enter, they may choose to take either a diploma or a degree course. All new teachers are mentored for the first few years by the NIE (OECD, 2012c). Japanese students have to attend a ministry-certified teacher education programme at a junior college or university to become a teacher (OECD, 2011c). National teacher training universities with model schools attached to them also exist to give teacher training to next teachers (OECD, 2011c). An induction programme also exists that gives students the opportunity to work for a year with a master

teacher before teaching full-time on their own. Master teachers are given a year off from their teaching jobs to supervise the new prospective teachers (OECD, 2011c). In Finland, teacher training programs are structured in such a way that people work autonomously and rely on scientific knowledge and skills gained in universities to guide their teaching practices (OECD, 2014a). Primary-grade teachers major in education and also minor in at least two subjects that are taught in a primary school curriculum. Upper-grade teachers major in the subject they will be teaching, and complete a fifth year focused on education practice. Teacher candidates are also expected to write a research-based dissertation as their final requirement for their master's degree that shows a holistic view of the learning process and teaching (OECD, 2014a). Finland education programs also have a major clinical component where students practice teaching skills in front of their peers and in Teacher Training Schools run by the universities (OECD, 2014a). Practice teaching is one-third of the curriculum for Finnish education programs (OECD, 2014a). Teacher training programs for Canada are run by Canadian universities. Their training program includes completing a bachelor's of education degree, or a bachelor's with additional education certification (Top Performing Countries).

In Portugal, teachers acquire professional qualifications through higher education programs and graduate with a *Licenciatura* degree. The curriculum is meant to promote learning of different functions needed to meet the demands of a teaching career, ensure integration of pedagogical features into practical components, and enhance critical analysis and pedagogical innovation (Portuguesa, 2000). However, there are many teachers in the classroom who have not gone through a teacher higher-education program or have obtained a teaching certificate (Portuguesa, 2000). Not all teachers in the United States have received a bachelor's degree in

education. In fact studies have shown that more-selective universities have actually become less likely to offer undergraduate education programs that allows students to earn their teacher certification in four years (Teach.org). The percentage of students who have earned bachelor's degrees dropped from ten percent in 1990 to six percent in 2010 (Wei, Darling-Hammond). Luxembourg's education programs are run through a European consecutive model in which teachers begin their education program after or close to the end of their degree. General initial teacher education courses are taken abroad because these programs are not offered in Luxembourg itself (Key Data on Teachers and School Leaders in Europe). There are many teachers in Luxembourg who have not earned an education degree. Spain also practices under the consecutive model (Key Data on Teachers and School Leaders in Europe). It does not appear that there are other alternative routes to become a teacher in Spain beyond completing a degree through the consecutive model. Hungary practices under the consecutive model as well (Key Data on Teachers and School Leaders in Europe). There does not appear to be any evidence that Hungarian teachers can become teachers beyond the consecutive model route.

Brazil has teacher training that is implemented in different modes, partially in intermediate schools and partially in higher education (Principles, Aims and Objectives). Intermediate school training has three year courses with an additional year of studies that qualifies teachers to work in the fifth and six grades of fundamental school, along with other specializations (Principles, Aims and Objectives). Higher education trains teachers for fundamental and intermediate schools, as well as special education and preschool courses (Principles, Aims and Objectives). However, teachers who do not meet the minimum requirements for completing these programs are offered opportunities for professional training

(Principles, Aims and Objectives). Not all teachers in Brazil graduate from the intermediate school or higher education programs. In Argentina, teacher training for the secondary level is completed in normal schools. By completing a five-year normal school prospective teachers are able to earn a teaching certificate and permission to teach in a primary school or provincial school if the certificate is approved by the local authorities. An extra four-year requirement is set in place for secondary teacher-training schools, as well as an extra two years for teaching kindergarten (Argentina-Teaching Profession). Although additional measures are set in place for secondary and kindergarten teachers, teachers for most grade levels are not required to enroll in an education program. In Indonesia teachers must hold a bachelor's degree and earn a teaching certificate, but they do not have to graduate from a teacher education program to teach (Supriatna). Qatar teachers are not required to graduate from a teacher education program to enter the classroom, as more than 30 percent of school teachers are unqualified to teach (Ferris-Lay, 2011). In Peru teachers are required to enter either a pedagogical institution or a university education program. The pedagogical institutions tend to provide a consistent program of instruction from institution to institution, while the university education varies (Ferris). The pedagogical institutes are often a good substitute for university admissions and are usually more accessible than taking the academic university track (Education in Peru: History, Currently System, and Equity). The focus in institutes is more on content competencies than on teaching methodologies (Education in Peru: History, Current System, and Equity).

Whether or not a system requires prospective teachers to graduate from a country's teacher education program seems to be slightly correlated with educational outcomes. It appears that while all high-performing systems require teachers to graduate from a teacher education

program, a few middle and low performing systems require this as well. While teacher training programs seem to be a step in the right direction, they do not always seem to deliver teachers with high outcomes.

The next category analyzed is whether or not all teachers are required to hold a teaching-certificate to teach. All five high-performing systems require teachers to hold a teaching-certificate to teach, as do two middle-performing and four low-performing systems. Shanghai, Singapore, Japan, Finland, Canada require teaching certificates, as does Spain, Hungary, Indonesia, Qatar, and Peru. In Shanghai, all primary school teachers must hold a sub-degree diploma and all teachers in secondary schools must hold professional certification. Singapore teachers also receive certification through their diploma or degree course (OECD, 2012c). Japanese teachers gain their teacher certification from ministry-certified teacher education programmes or teacher training universities (OECD, 2011c). Finnish teachers are required to become certified, and do not earn their certification until they have earned a master's degree (OECD, 2014a). Canada also requires teacher certification. Typically students earn a bachelor's degree in education or a bachelor's degree with an additional education certification. Following the initial education, most provinces require another examination or certification process (Top Performing Countries).

In Portugal, teachers receive a diploma certifying specific professional qualifications after completing the *licenciatura* programmes (Portuguesa, 2000). However, a large percentage of school teachers in Portugal do not hold professional qualification (Portuguesa, 2000). In the United States, students receive a teaching certificate after graduating with a bachelor's in

education. Earning an alternative teaching certificate is also possible for students who did not graduate with a bachelor's degree in education. However, states have many exceptions to having teachers even hold an alternative certification. For example, in Tennessee permission is granted to local school systems to employ an individual without a valid license when a school system is unable to obtain services of a qualified teacher for a vacant position (Teach.org). A "waiver" can also be granted to fully-licensed teachers who teach three or more classes a day outside of their licensed endorsement (Teach.org). Interim B Licenses are also made available to candidates who have met program requirements for certification, but cannot obtain passing scores on Praxis II exams. This license can be renewed once with no questions asked, while the second renewal requires verification of a "handicapping" condition (Teach.org). In Luxembourg, teachers can obtain a permanent contract without going through a teacher education program or earning a teaching certificate by undertaking in an employment-based training of 60 hours (Key Data on Teachers and School Leaders in Europe). It appears that teachers in Spain and Hungary are required to obtain a teaching certificate through their teacher education program. However, Hungary deals with major teacher shortages and inadequacy; especially in science and mathematics (Dobos, Ocsko & Vasarhelyi, 2001).

In Brazil, only about half of teachers in the public school system have a higher-education teacher qualification (Principles, Aims and Objectives). Teaching certificates are required for Argentina teachers and given after completion of a five-year normal school. While all five high-performing systems require teaching certificates, so do two middle-performing systems, and three low-performing systems. While it seems odd that three low-performing systems require teaching certificates for all teachers while only two middle-performing systems do, it is possible

that some systems may be less transparent online and in scholarly resources about their certification exceptions. Regardless, this data seems to indicate that while teaching certificates are traits all high-performing systems possess, a certificate on its own does not seem to be correlated with outcomes.

The next category for teacher quality that is studied is whether teachers are required to hold a post-secondary degree to teach. All five high and middle performing systems require teachers to hold a post-secondary degree, as does one low-performing system. These systems include Shanghai, Singapore, Japan, Finland, Canada, Portugal, United States, Luxembourg, Spain, Hungary, and Indonesia. One exception is Shanghai primary school teachers, who may enroll in teacher education school immediately following junior secondary school (Top Performing Systems). Japan also has one other exception. Prospective teachers who have completed college at a junior college teaching program are also able to hold a temporary certification that is valid for fifteen years in Japan (Top Performing Systems). The majority of Japanese teachers however, do hold a bachelor's degree (Top Performing Systems). It appears that ensuring most teachers hold a post-secondary degree is a common trait of high or middle performance levels, but it is not a trait that is correlated with success on its own.

Whether or not teachers must hold a master's degree to teach is the next category analyzed. Finland is the only system that requires teachers to hold a master's degree to teach. While requiring teachers to hold a master's degree is a high-standard of Finland that likely contributes to their high-performance level, it is not a requirement that all systems use to ensure their high outcomes.

Whether the ratio of upper-secondary teacher's salaries at the top-of-scale to starting salary is above or below the OECD average is analyzed next. The OECD average ratio is 1.62 (OECD Education GPS). This information is used as a category for study instead of salary amount, as cost-of-living varies so much from region to region. Salary-growth over time would offer a more accurate comparison. The OECD only measured the salary ratio for three of the top-performing systems that are analyzed in this study, and three of the middle-performing systems. However it is important to see if a pattern still emerges between the systems that had salary data available. One high-performing and two- middle performing system has a ratio that is above the OECD average, while two high-performing and one middle-performing has a salary ratio that is below the OECD average. Japan has a ratio of 2.26, while Finland has a ratio of 1.32 and Canada a ratio of 1.57 (OECD Education GPS). Portugal has a salary-ratio of 1.66, while the United States has a ratio of 1.48 and Hungary has a ratio of 1.88 (OECD Education GPS). From the data available, it appears that teacher salary-growth over time does not have a high-correlation with educational performance.

The last category that is used for analysis is whether or not teachers are required to complete extensive professional development as teachers. All top-performing systems require extensive professional development, as do three middle-performing systems. However, the amount of professional development the high-performing systems display still far exceeds the extensive development required for the three middle-performing systems. Systems that require extensive professional development include Shanghai, Singapore, Japan, Finland, Canada, Luxembourg, Spain, and Hungary. Shanghai teachers are expected to engage in 240 hours of professional development in five years (OECD, 2012b). Because so much professional

development is involved for Shanghai teachers, they are seen as autonomous professionals who can independently handle any difficult teaching situation (OECD, 2012b). Singapore teachers are entitled to 100 hours of professional development per year to constantly keep improving their teaching practice (OECD, 2012c). Teachers can complete their 100 hours in several years (OECD, 2012c). Each school also funds growth by giving teachers the opportunity to go abroad to learn the aspects of education in different countries (OECD, 2012c). Professional development is required for Japan as well. Each local school board decides a minimum number of hours teachers must spend on professional development each year (Top Performing Systems). Teachers must also prove they are up-to-date with their practices and skills every ten years to renew their teaching certificates (Top Performing Systems). Daily in-service training is also provided by prefectural boards every five, ten, and twenty years into teacher's careers (Top Performing Systems). Continuous professional development is required for Finnish teachers throughout their career. Professional development requirements are different from municipality to municipality. Time spent on professional development varies from area to area, but the national government is required fund at least three days of mandatory professional development each year (Top Performing Systems). Finnish teachers spend seven days a year on professional development, on average (Top Performing Systems). Different professional development requirements vary from location to location in Canada, although all provincial Ministries of Education require and support ongoing teacher training efforts (Top Performing Systems). Professional development programs are extensive and range from content knowledge issues to important social issues present in the classroom (Top Performing Systems).

Portugal only has a minimum requirement of 15 hours of in-service teacher education (Portuguesa, 2000). Professional development is largely an individual choice in Portugal that is driven by career advancement (Portuguesa, 2000). The National Staff Development Council reports that in 2008 the percentage of teachers in the United States who had completed more than 33 hours of professional development on the content of the subject that they teach was only 23.8% (Wei, Darling-Hammond, & Adamson, 2010). Only 7.7% of teachers received over 33 hours of development on reading instruction, and only 2% had over 33 hours of development on student management in the classroom (Wei, Darling-Hammond, & Adamson, 2010).

Luxembourg has an exact minimum number of hours that each teacher is expected to attend professional development, and does not offer any incentives for their completion (Key Data on Teachers and School Leaders in Europe). In Spain, each territory is responsible for their own professional development plans. Additional pay allowances are paid every five or six years to teachers who participate in a minimum number of professional development activities (Key Data on Teachers and School Leaders in Europe). Teachers in Spain can earn up to a maximum of five additional salary supplements throughout their careers for taking part in professional development (Key Data on Teachers and School Leaders in Europe). In Hungary, teachers are required to attend 120 hours of professional development every seven years to continue teaching (Key Data on Teachers and School Leaders in Europe).

From the resources I consulted, it does not appear that Brazil or Argentina require any professional development minimums. In Indonesia, in-service training has only been facilitated to a small number of teachers as training accommodations can be expensive (Supriatna). Professional development is gaining importance in Peru, but teachers are not yet required to have

a personal plan (Education in Peru: History, Current Systems and Equity). This data seems to indicate that the amount of professional development required is an important indicator for educational outcomes, but quality of the development seems to play a large role. Portugal and the United States do not have professional development requirements for the overall system, but still outperform the three other middle-performing systems that do require it. The data collected on teacher quality as seen in Figure F leads me to believe that there is a high-correlation between educational outcomes and recruiting teachers from the top pool of graduates, the respect-level of teachers in society, and teacher selectivity.

Policy Recommendations

In summary, it appears that there are four factors that have a high correlation with top-educational performance. These include ensuring that the teaching force is recruited from the top pool of graduates, insuring the teaching field is held to a high-level of prestige in society, holding a high selectivity process for teachers, and holding a deep belief that all students are capable of achieving at the highest levels. In order to move middle and low-performing systems into a higher trajectory, the top educational priority should be to incorporate the four top-factors into their individual systems.

There is one global network in existence today that works to expand educational opportunity and has the four educational top-factors engrained in their organization—Teach For All. Teach For All states, “The world’s most disadvantaged students need as many teachers as possible with a vision for defying expectations. We need teachers who are willing to rise above the challenges they face, and make up for weaknesses in schools and systems. Their leadership, high standards, and firm belief in their students’ abilities inspire those students to believe in themselves and strive for formerly unimaginable goals” (TFA). The organizations that make up the Teach For All network enlist their nation’s most outstanding future leaders into a teaching corps to work towards close the education gap in their own countries (TFA). Teach For All believes that there are high similarities in the nature of problems from system to system, so by working together they can better combat educational issues (TFA). Teach For All networking partner organizations that are an existence for the systems chosen in this study include Teach For America, Empieza por Educar, Enseña Perú, and Teach For Qatar (TFA). There are thirty-five

current Teach For All partner organizations in existence—others include programs such as Teach For Thailand, TEACH South Africa, Teach For Lebanon, and Teach for the Philippines (TFA).

Each Teach For All partner organization enlists top-graduates into their teaching corps through a highly selective process (TFA). Teach For America has a selection model that enlists corps members based-off of nine traits they have seen in the most successful teachers. These traits include demonstrated leadership ability, a deep belief in the potential of all kids regardless of their background, strong achievement in academics, volunteer settings, and extracurricular activities, perseverance in the face of challenges, commitment to reaching goals, excellent critical thinking skills, the ability to motivate others, excellent organizational ability, and respect of diverse experiences and backgrounds (TFA). Teach For America is seen as a highly prestigious program; in fact in 2010 18% of Yale students applied for the corps (New York Times). Through its selection model and mission, Teach For America encompasses the four top-indicators of performance outcomes—high teacher selectivity, recruiting from a top cohort of graduates, high-prestige level, and belief in all-children regardless of socio-economic status.

Because the different Teach For All network organizations recruit leaders who are citizens of the countries themselves, it can be better ensured that each country has their own particular cultural contexts integrated into the curriculum. In Teach For America, there are 10,600 current program teachers (TFA). That means that out of all teachers in the United States, there are at least 10,600 current teaching professionals that went through a highly selective hiring process, have a deep belief in all children's potential, are held to a high-level of prestige, and were recruited from a top-pool of graduates. But to truly move an education system into a higher

trajectory and create substantially greater outcomes, we need all teachers to be placed in the classroom based off of the four top-performance indicators—not just a small cohort of individuals that make up organizations such as Teach For America. By going a step beyond the Teach For America selection model and recruiting top-students to go through intensive teacher training with the incentive of high salary, we could make huge educational gains all around the world.

My policy recommendation for middle and low-performing system is that each system should implement a highly-selective teacher recruitment model that incorporates intensive teacher training and continues with high-quality teacher development. Each system should recruit from its top-graduates and raise salary to a rate that is competitive with other professional career choices for that region. By offering a competitive salary, regions can ensure that the highest-achieving students are not tempted to go into higher-paying fields instead. It is not a question of how a region can afford to allocate money to improve teacher salary—but a question of: how can a region not afford it. Education should be seen as an investment; high-education system performance can become a gateway towards greater economic development. Following teacher salary raises and high-standards held for prospective teachers, high-teacher prestige level is likely to follow as well.

One common complaint of education reform plans is that the reforms do not take into account a country's own cultural context. Tensions may easily begin between the local indigenous culture and the policy-decision makers (Pereira, 2013). This was very true of educational reform efforts in Qatar. Locals in the Qatar community believed previous reform

efforts to be a model adopted from another country, and not one in which was suitable for the local context (Pereira, 2013). For this reason, each education system's education training program should be created by top-education experts from around the world who could work with educational leaders from each country to ensure a training program is created that is appropriate for a country's cultural context.

United States Program Recommendation

A program such as the one described above that incorporates all top-performance education factors could be very viable improvement option for the United States. The United States could begin a highly-selective new teacher training program with the incentive that students who complete the program would earn a salary competitive with that of other professions. This competitive salary idea is similar to an idea utilized in Singapore's system. In Singapore the starting salaries of other professions are monitored and teacher salary is adjusted to ensure it is as equally attractive as other professions (OECD, 2012c). Japan also used a similar reform measure in the past, raising teacher salaries to 30% higher than other public servants. When teachers in Japan begin their service today, they are paid as well as new engineers (OECD, 2011c).

This program could have the potential to create an entire new brand of teacher prestige in America. Students could apply to this new teacher training program in a similar manner that students apply to American nursing schools. Students would have the option of beginning the program after their second year of undergrad, or could also apply after they have already completed a bachelor's degree in another field. Prospective-teachers would have to take a

standardized test as a requirement that is similar to the GRE or GMAT, and only if a student receives a certain high-level score could a student be considered for the program. The prospective-teacher would then under-go an extensive application and interview process to ensure that the individual meets the high-quality selection model they are looking for. That selection model would be similar to that of the Teach For America's, as it selects high-quality individuals who also have a deep belief in the potential of all children.

As inspired by Singapore, a major characteristic of this reform is that the key does not just lie in the training program itself, but in identifying and developing strong, young talent (OECD, 2012c). Like in Singapore, more effort would be put in the front-end of recruiting top-quality individuals and then giving them effective training and continual support (OECD, 2012c). The new selection process for the United States stems from Finland as well, where only the best and brightest are able to make it through the teacher selection process (OECD, 2014a).

The program would be an academically rigorous three year program all together, while two of those years would be spent in the classroom. Training classes would be taught by a cohort of expert educators from around the world who have worked together to develop an extensive program based on pedagogy agreed to best engage student learning. In Finland and other high performing systems, teaching is seen as a profession that relies on scientific knowledge and skills gained through university studies (OECD, 2014a). This U.S. program would work under the same scientific approach as Finland, where teachers diagnose problems, apply evidence-based solutions, and analyze the impact of their procedure (OECD, 2014a).

After the second year in training a student would graduate with their degree, but to become certified they would have to complete a classroom internship with a highly-skilled teacher. Japan offers a similar apprenticeship program in which master teachers are given a year off from their teaching jobs to supervise their apprentices in the classroom (OECD, 2011c). Prospective-teachers would also receive regular teacher salary offered by the school district during their internship year. The internship salary from this program is adapted from an aspect of Singapore's system, in which prospective teachers receive a monthly salary competitive with that of new-graduates in other professions while completing their training program (OECD, 2012c). Once a student completed their year of internship, they would officially complete the teacher training program and receive the new, competitive salary each year as a teacher.

To continue receiving the competitive salary, teachers would be required to complete fifty hours of professional development a year designed by the training program educators, and also engage in collaborative teachers circles and planning with others in the training cohort weekly. This area of the new U.S. training plan stems from high-performing systems' high teacher development requirements.

People who are already classroom teachers would be welcome to apply for the teacher program as well. If they meet the same application testing and selection model qualifications as stated earlier, they could have the option of completing an online teacher training program during after-school hours. After completing the program, they too would have the new, competitive salary. The training program could start with one cohort of students, but continue to grow larger and larger over time. Because teachers who graduate from this training program

would have extensive culturally-responsive teaching methods and qualification measures, this program could very much begin to change how teachers are viewed in American society.

Growing a high-quality teacher workforce with a deep belief in all children's potential would very likely lead to high student outcomes.

Recommendations For Future Research

Important future research on this topic would include the economic benefits of the teaching policy recommendations suggested in this paper. It is reasonable to assume that an increase in academic performance of students in the United States using the proposed teacher recruitment and development model would increase wages and GDP for America. Improved wages and GDP would also mean increased tax revenue for federal and state governments. This increase in revenue could in part be the basis to fund improvements in teacher compensation. Likely the economic benefits will be much larger than the cost for improved teacher compensation, so future research must be done that measures how improvements in academic performance translate into improved economic conditions. This then could become a viable strategy that policy makers and the American public can support.

Conclusion

By investing in structural reforms in education, we have the potential to better student opportunity and economic growth for all regions in the world (OECD, 2012c). Pinpointing strengths and weaknesses in a region's system can help us re-shape areas that have needed-growth. As discussed at the beginning of this paper, creating an exact combination of education practices that would work for all systems around the world is not possible. However, when trends emerge for the highest performing systems, those trends cannot be ignored. As trends have revealed in this research, a deep belief in all children's potential, high teacher-selectivity, top-graduate recruitment, and teacher prestige are incredibly important aspects of an education system that are correlated with high-outcomes. If each middle and low-performing system incorporates the four traits correlated with high-performance into their schools, it would give each region a firm foundation towards educational success.

APPENDIX A: HIGH PERFORMING EDUCATION SYSTEMS

High-Performing Education Systems

Rank	Country	2012 Combined Math Reading, and Science PISA Score	2012 GDP per capita
1	Shanghai-China	1,733	\$12,784
2	Singapore	1,666	\$52,052
3	Hong Kong-China	1,661	32,742
4	South Korea	1,628	\$22,590
5	Japan	1,621	\$46,731
6	Chinese Taipei	1,606	\$65,453
7	Finland	1,588	\$45,694
8	Estonia	1,578	\$16,833
9	Liechtenstein	1,576	\$134,617
10	Macao-China	1,568	\$49,756
11	Canada	1,566	\$51,206
12	Poland	1,562	\$12,710
13	Netherlands	1,556	\$45,960
14	Switzerland	1,555	\$78,928
15	Vietnam	1,547	\$1,755
16	Germany	1,546	\$42,597
17	Ireland	1,546	\$45,921
18	Australia	1,537	\$67,442
19	Belgium	1,529	\$43,399
20	New Zealand	1,528	\$38,637
21	United Kingdom	1,507	\$38,920

APPENDIX B: MIDDLE PERFORMING EDUCATION SYSTEMS

Middle-Performing Education Systems

Rank	Country	2012 Combined Math Reading, and Science PISA Score	2012 GDP per capita
22	Austria	1,502	\$18,690
23	Czech Republic	1,500	\$39,746
24	France	1,499	\$22,059
25	Slovenia	1,496	\$56,364
26	Denmark	1,494	\$99,636
27	Norway	1,488	\$2,175
28	Portugal	1,488	\$13,947
29	Latvia	1,482	\$13,947
30	United States	1,476	\$51,749
31	Luxembourg	1,469	\$103,858
32	Italy	1,469	\$33,816
33	Spain	1,468	\$28,274
34	Hungary	1,459	\$12,560
35	Iceland	1,454	\$42,339
36	Lithuania	1,452	\$14,172
37	Croatia	1,447	\$13,879
38	Sweden	1,446	\$55,040
39	Russian Federation	1,443	\$14,037
40	Israel	1,422	\$32,564
41	Slovak Republic	1,416	\$24,600

APPENDIX C: LOW-PERFORMING EDUCATION SYSTEMS

Low-Performing Education Systems

Rank	Country	2012 Combined Math Reading, and Science PISA Score	2012 GDP per capita
42	Greece	1,397	\$22,442
43	Turkey	1,386	\$10,666
44	Serbia	1,340	\$5,190
45	Cyprus	1,327	\$26,070
46	United Arab	1,324	\$41,692
47	Romania	1,322	\$8,437
48	Bulgaria	1,321	\$6,977
49	Thailand	1,312	\$5,480
50	Chile	1,309	\$15,452
51	Costa Rica	1,274	\$9,386
52	Mexico	1,252	\$9,749
53	Kazakhstan	1,250	\$12,121
54	Monterero	1,242	\$7,041
55	Malaysia	1,239	\$10,432
56	Uruguay	1,236	\$14,703
57	Brazil	1,206	\$11,340
58	Jordan	1,194	\$4,909
59	Tunisia	1,190	\$4,237
60	Argentina	1,190	\$11,573
61	Albania	1,185	\$4,000
62	Columbia	1,178	\$7,748
63	Indonesia	1,153	\$3,557
64	Qatar	1,148	\$93,825
65	Peru	1,125	\$6,796

APPENDIX D: EDUCATION SYSTEMS CHOSEN FOR STUDY

Education Systems Chosen For Study

Rank	Country	2012 Combined Math Reading, and Science PISA Score	2012 GDP per capita
1	Shanghai- China	1,733	\$12,784
2	Singapore	1,666	\$52,052
5	Japan	1,621	\$46,731
7	Finland	1,588	\$45,694
11	Canada	1,566	\$51,206
28	Portugal	1,488	\$13,947
30	United States	1,476	\$51,749
31	Luxembourg	1,469	\$103,858
33	Spain	1,468	\$28,274
34	Hungary	1,459	\$12,560
57	Brazil	1,206	\$11,340
60	Argentina	1,190	\$11,573
63	Indonesia	1,153	\$3,557
64	Qatar	1,148	\$93,825
65	Peru	1,125	\$6,796

APPENDIX E: CURRICULUM VARIABLES

	Shanghia-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Majority of principals and teachers report that they have responsibility for the task of determining course content.			X	X									X		X
Majority of principals and teachers report that they do not have responsibility for the task of determining course content.	X	X			X	X	X	X	X	X	X	X		X	
Majority of principals and teachers are given the responsibility of choosing which textbooks are used in the classroom			X	X		X			X	X			X		
Majority of principals and teachers are not given the responsibility of choosing which textbooks are used in the classroom	X	X			X		X	X			X	X		X	X
Majority of teachers and principals believe they have considerable responsibility for establishing assessment policies			X	X								X	X		X
Majority of teachers and principals do not believe they have considerable responsibility for establishing assessment policies	X	X			X	X	X	X	X	X	X			X	
Majority of principals and teachers are given the responsibility of deciding which courses are offered in their schools	X	X			X	X	X	X		X	X		X	X	

	Shanghia-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Majority of principals and teachers are not given the responsibility of deciding which courses are offered in their schools			X	X					X			X			X
National Assessment given at upper-secondary level							X			X	X		X	X	
National Assessment given at lower-secondary level	X		X	X			X		X	X	X		X	X	
Compulsory instruction time for students above OECD average					X	X	X	X							
Compulsory instruction time for students below OECD average			X	X					X	X					

 Information Is Not Available

 Answer Varies

APPENDIX F: EDUCATION STRUCTURE VARIABLES

	Shanghia-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Funded predominantly by central government		X												X	
Funded predominantly by state or local government	X				X	X			X	X					
Funded by combination of central and local government			X	X			X	X			X	X	X		X
Expenditure on educational institutions as a percentage of GDP is higher than OECD average (6.1%)				X	X		X					X			
Expenditure on educational institutions as a percentage of GDP is lower than OECD average (6.1%)	X	X	X				X	X	X	X	X		X	X	X
Education goals determined predominantly by state or local government					X				X	X			X		
Ministry of Education determines national education goals	X	X	X	X		X	X	X			X	X		X	X
Majority of students in government or public schools	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Majority of students in independent private schools															
Both Academic and Vocational Secondary school tracks	X	X	X	X		X				X	X	X	X	X	
Only Academic Secondary school track					X		X	X							X

APPENDIX G: EDUCATION EQUALITY VARIABLES

	Shanghai-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Student-teacher ratio among students in socio-economically disadvantaged schools higher than student-teacher ratio among students in socio-economically advantaged schools	X								X	X	X		X		
Student-teacher ratio among students in socio-economically disadvantaged schools lower than student-teacher ratio among students in socio-economically advantaged schools		X	X	X	X	X	X	X				X		X	X
Percentage of students in bottom quarter of PISA index for economic, cultural, and social status who perform in the top quarter of students on PISA above OECD average (6.38%)	X	X	X	X	X	X			X						
Percentage of students in bottom quarter of PISA index for economic, cultural, and social status who perform in the top quarter of students on PISA below OECD average (6.38%)							X	X		X	X	X	X	X	X

	Shanghia-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Percentage of immigrant students in socio-economically disadvantaged schools above OECD average (15.7%)					X		X	X						X	
Percentage of immigrant students in socio-economically disadvantaged schools below OECD average (15.7%)	X	X	X	X		X			X	X	X	X	X		X
Average PISA performance among students attending schools located in a large city has more than a 10 point difference than students attending schools in a village or rural area	NA	NA	NA			NA		NA		X			X	X	X
Average PISA performance among students attending schools located in a large city has less than a 10 point difference than students attending schools in a village or rural area	NA	NA	NA	X	X	NA	X	NA	X		X	X			

APPENDIX H: TEACHER QUALITY VARIABLES

	Shanghia-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Teachers are recruited from the top pool of graduates	X	X	X	X	X										
Teaching is considered a highly-respected position in society	X	X	X	X	X										
Receiving a teaching position is highly-selective	X	X	X	X	X										
Prospective teachers must graduate from a country's teacher education program	X	X	X	X	X				X	X					X
All teachers must hold a teaching-certificate	X	X	X	X	X				X	X		X	X	X	X

	Shanghia-China	Singapore	Japan	Finland	Canada	Portugal	United States	Luxembourg	Spain	Hungary	Brazil	Argentina	Indonesia	Qatar	Peru
Teachers must hold a post-secondary degree to teach	X	X	X	X	X	X	X	X	X	X			X		
Teachers must have a masters degree to teach				X											
Ratio of upper secondary teachers salaries at top of scale to starting salary is above OECD average (1.62)			X			X				X					
Ratio of upper secondary teachers salaries at top of scale to starting salary is below OECD average (1.62)				X	X		X								
Teachers are required to complete extensive professional development	X	X	X	X	X			X	X	X					

Information is not available

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