Evaluating the Effectiveness of National Assessment Scores as a Tool for Comparison with Other Nations

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Abstract

Reports identifying the United States as academically weak as compared to other nations have incited the attention of Americans and those abroad. International Comparisons based on national assessment data show the U.S. falling behind other students, especially those in Asian countries, and have sparked education reform. This paper presents an overview of research highlighting that comparisons based on national assessments provide ambiguous conclusions. Focus will be placed on differences in the student population assessed in each country, curriculum, and teacher training and recruitment.

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Introduction

International assessments, such as the Program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), are designed to measure the learning outcomes of students in multiple countries (Wagner, Babson, & Murphy, 2011). Comparison tables based on the results of these assessments rank the order of achievement scores by nation or region and have been a source of information for media and national reports for decades. These news reports often depict how poorly American students are performing academically compared to their peers abroad, especially those in Asian countries, but, as Koretz (2009) states, the data "are more limited and more complex than is often realized" (p. 38).

In 1983, *A Nation at Risk* reported the performance of students in the United States educational system as mediocre and weak compared to students in other countries (National Commission on Excellence in Education, 1983). This report spurred significant attention and triggered an educational reform movement to improve the achievement of American students. Since that time, these international comparisons have become a fundamental source of public debate (Koretz, 2009; Zhoa, 2006).

This paper will discuss the reliability of international assessments, specifically the PISA and TIMSS, as well as differences between those students tested in the United States, Japan, Singapore, China, and Hong Kong. Also discussed will be differences in each country's curricula and their process for teacher recruitment and training programs.

Reliability of International Assessment Comparisons

When looking at the comparison of student scores fashioned by using the results of International Assessments, there are many factors that should be taken into

consideration. One of those factors is the characteristics of the assessments themselves. The PISA and TIMSS are two of the primary international student evaluations that receive the most attention in the U.S. The results of these evaluations are often mentioned interchangeably, but the tests are quite different.

The PISA assessment is designed for students 15 years of age, and this assessment measures literacy in reading, mathematics, and science. Those students who are not being schooled are intentionally excluded. It is intended to measure problem solving and functional skills that students have acquired and their ability to apply this knowledge to real world problems (National Center for Education Statistics, 2013). The test is not designed to parallel curriculum, and tests items are not designed to be similar to those on curriculum based tests.

In Comparison, the TIMSS assesses mathematic and science achievement of students in the fourth and eighth grade and is designed to relatively follow curricula (National Center for Education Statistics, 2013). These differences make comparisons between the PISA and TIMSS almost meaningless. For example, in 2003, Norway scored far below the United States in the area of eighth-grade mathematics on the TIMMS assessment. However, in that same year, they outscored the U.S. in mathematics on the PISA. These disparities may reflect any number of international or assessment differences and make it difficult to explain the differences with any confidence (Koretz, 2009).

Table 1

Comparison of National Assessments

National Assessment	Population Assessed	Assessment Measures
PISA	15 years and 3 months up to 16 years and 2 months	The PISA concentrates on problem solving and functional skills and analyses the creative application of knowledge in Reading, Mathematics, and Science.
TIMSS	Fourth through Eighth Grade Students	The TIMSS assesses Mathematic and Science achievement and is designed to relatively follow curricula.

The Global Report Card (GRC) was developed as part of the George W. Bush Institute's Education Reform Initiative and seeks to compare the academic achievement of U.S school districts with those of 25 other countries who might be considered economic peers (Greene & McGee, 2012). Using a detailed methodology including data obtained from the National Assessment of Educational Progress (NAEP) and the PISA, comparisons are made and posted on the GRC website for public viewing. The developers of this index used these results as a basis for stating that even the most elite schools in the United States are mediocre when compared to those of other nations. However, in the same report, they stress that the scores are not exact and are "comparing the performance of students who took different tests, in different grades, and sometimes in different years" and that they must "assume that tests are normally distributed" (Greene & McGee, 2012, p. 36). Phillips (2007) asserts differing definitions of performance standards and a lack of common metrics make it difficult to compare the achievement of students in the United States with other nations. "The difficulty is similar

to trying to compare the U.S. poverty level to that of other countries in the world" (Phillips, 2007, p. 1).

A second factor to consider is the actual student population assessed in each country. The term "international" reflects the collection of countries that participate in the assessment during a specific year. From these countries, a random selection of schools takes place and the tests are administered. Koretz (2009), when speaking of international assessments, avows that the tests "function much like political polls, which use the views of a few people to predict the voting behavior of a much larger group of people, most of whom are not surveyed" (p. 40). The test scores of a few students are then averaged and used to represent the academic achievement of an entire nation. These scores are compared to the scores of other nations, yet there is no consideration for the many differences in the student populations of these countries. Several of these differences stem from variances in educational law and policy within each country that govern such issues as the inclusion of exceptional students in the general education population and compulsory education.

Exceptional Students

The Organization for Economic Co-operation and Development (2013) states that schools are randomly selected by the international contractor in each country to be administered the PISA. Within these schools, the choice of students taking the assessment is kept as inclusive as possible in order to represent an all-encompassing range of ability levels. One objective of national exams may be to assess multiple abilities, but due to legislation, the range of ability levels in each country can vary greatly.

In the United States, the Individuals with Disabilities Education Act (IDEA) goes far beyond the requirements of the Fourteenth Amendment to provide a free appropriate public education for students with disabilities. This mandate includes educating children in the general education classroom to the maximum extent appropriate. In 2001, the signing of No Child Left Behind by President George W. Bush set the goal of every student being on grade level by 2014. This includes America's special education population. During the 2009-2010 school year, this totaled 6.5 million students between the ages of 3 and 21 and accounted for approximately 13 percent of public school students (National Center for Education Statistics, 2013). These students, with the exception of only one percent, take standardized exams and are included in the school population when national assessments are administered.

Japan, a top ranked nation in international assessments, has no legislation defining clear standards by which services should be provided to students with disabilities in the public school system. Although the Constitution of Japan stipulates that students should receive an education that corresponds to their ability, the government of Japan is reported to ignore the philosophy of inclusion and enforce a separate education for students with disabilities in self contained special schools (Nagano & Weinberg, 2012). According to the 2009 Report of the Ministry of Education, Culture, Sports, Science, and Technology, there were 1,225 of these schools operating at that time for students with visual impairments, hearing impairments, cognitive disorders, physical disabilities, and health related issues. For those few students with disabilities who are admitted to public schools, an entrance exam must be taken before they are allowed to attend a high school with non-disabled peers. This exclusion from the general education population greatly reduces the

number of students with exceptional needs that would participate in a national exam in any chosen school.

Singapore's educational system, like Japan, provides special schools for children with disabilities. These self contained schools cater to students with hearing impairments, Autism, mild to severe intellectual disabilities, multiple disabilities, visual impairments, and physical impairments (Ministry of Education, Singapore, 2013). Although most students with special needs attend these self contained schools, students with learning disabilities such as dyslexia are often mainstreamed into the general education classroom. They are referred to the Enhanced Learning Support Program and receive enrichment from Teachers Trained in Special Needs (TSNs) and Special Needs Officers (SNOs) (Ministry of Education, Singapore, 2013). In 2004, students with learning disabilities constituted five percent of the student population (Tam, Seevers, Gardner, & Heng, 2006). In comparison, that same year the percentage of students in the United States with learning disabilities totaled 13.8. That figure alone skews any cross-nation comparison that could be made even without taking into consideration the percentages of students with other disabilities served in U.S. schools.

China, whose city of Shanghai was top ranked on the 2009 PISA findings, has the largest population of individuals with disabilities in the world. Although the country has changed its model of special education from separate to inclusive schools for those with sensory and intellectual disabilities, public attitudes toward those with disabilities have caused challenges (Hampton & Xiao, 2009). Kritzer (2012), compares special education in China to that in the Unites States prior to the Education for all Handicapped Children Act of 1975. Parents and students have few rights, and many with disabilities in rural

areas do not attend school. In Hong Kong, part of the People's Republic of China, the vast majority of students with special needs continue to be educated in special schools (Forlin, 2007).

Table 2

Comparison of Exceptional Education by Country

Country	**Education of Exceptional Students**	**Inclusion in National Assessments**
United States	Legislation requires that all students with exceptionalities be provided a free appropriate public education.	All students are subject to be included in the national assessments except for the one percent of exceptional students with the most severe disabilities.
Japan	There is no legislation defining clear standards for services provided for students with exceptionalities.	The majority of students with exceptionalities continue to be served in special schools and therefore are not encompassed in the population of students who are subject to be included in the national assessments.
Singapore	Special schools are provided for the majority of students with exceptionalities. Approximately five percent of students with exceptionalities are mainstreamed.	The majority of students with exceptionalities continue to be served in special schools and therefore are not encompassed in the population of students who are subject to be included in the national assessments.
China	The vast majority of exceptional students continue to be educated in special schools. Parents have few rights and many with disabilities in rural areas do not attend school.	The majority of students with exceptionalities do not attend school or are served in special schools and therefore are not encompassed in the population of students who are subject to be included in the national assessments.

Compulsory Education

A compulsory education requirement refers to the expected number of years by law that a student will be educated. In the United States, this requirement will vary by

state, but all have a minimum requirement of 16 years of age. This number is important when comparing students with other nations based on assessment data. For example, the PISA focuses on students from 15 years three months of age to age 16 years two months. In some countries, certain populations of students may not be schooled at this age thus distorting comparisons.

In Japan, there is no compulsory education at the high school level (Nagano & Weinberg, 2012). At the age of 15, students complete the High School Entrance Exam to determine if they will move on to Upper Secondary School. It is estimated that 90 percent of students will go on to graduate from high school, meaning that they are in school when national assessments are given, but the ten percent who did not score adequately on the entrance exam are not included in the population assessed (Bugaj, 2009).

The Compulsory Education Act (Cap 51) states that students between the ages of six and 15 in Singapore must attend a national school regularly unless there has been an exemption. These exemptions include children with special needs, home-schooling, or children attending a designated school. Upon the completion of primary education, around the age of 12, students are administered the Primary School Leaving Examination (PSLE). The results of this exam are used to disperse students into four different educational tracks; Special, Express, Normal (Academic) or Normal (Technical). However, as previously stated, the participation in these programs are only compulsory until the age of 15 (Ministry of Education, Singapore, 2013).

The Compulsory Education Law of China universally implemented nine years of compulsory education (Yanqing, 2012). Once students have completed Primary School and Junior Secondary School, they complete a Senior Secondary School Entrance

Examination. This exam, given at age 15, determines if students will go on to Senior Secondary School. Those not eligible based on this assessment can go to Specialized, Vocational, or Crafts schools, but no education beyond 15 years of age is required. As in the case of Japan and Singapore, this can differentiate the population of students taking national assessments designed to make comparisons from those students taking the assessments in the United States.

Table 3

Comparison of Compulsory Education by Country

Country	Compulsory Education Requirement	Secondary Education Process
United States	Compulsory education varies by state, but there is a minimum age of 16.	All students in the school system progress to secondary education.
Japan	There is no compulsory education at the high school level.	Students complete a High School Entrance Exam at age 15 to determine if they will move on to Secondary School.
Singapore	Students from age six to sixteen must attend a national school unless exempted. Exemptions are given for children with special needs, those attending designated schools, and home-schooling.	Around age 12, students are administered the Primary School Leaving Examination. These results are used to disperse students into for different educational tracks; Special, Express, Normal (Academic) and Normal (Technical).
China	Nine years of education is implemented.	At age 15, students complete the Senior Secondary Entrance Exam to determine if they will go on to attend secondary school.

Curriculum

With the PISA designed to measure application of knowledge and the TIMMS assessment closely following subject area curriculum, it is important to note the differences in the curricula makeup of countries assessed. Research indicates that educational reform is present in countries around the world as systems strive to meet the needs of diverse groups of learners; however, these reforms can differ greatly from one country to the next. As school systems in the United States are pushed to meet expectations on standardized tests or face consequences, countries such as Japan, Singapore, and China are starting educational reforms to foster creativity and innovative thinking (Zhao, 2006).

Japan, who was once thought to have trained rather than educated students, has added targets to their curriculum including creativity, replacing memorization for higher levels of thinking, and reducing the school week to five days. The Japanese school curriculum includes the areas of subjects, moral education, and extra-curricular activities. More elective subjects were added to develop individuality and help students realize their full potential (Komatsu, 2002).

China is also implementing a more flexible system to offer added choices and electives to their students, and are seeking to reduce burdens such as homework and study time spent by students outside of school hours. In 2002, just after NCLB raised the status of standardized testing, the Chinese Ministry of Education released an executive order to substantially minimize the consequences of assessments (Yong, 2006).

The Curriculum Development Council (CDC) of the Education Bureau in Hong Kong has implemented a curriculum reform focusing on whole-person development and

life-long learning experiences. Domains addressed include ethics, intellect, social skills, and physical development according to individual potential (CDC, 2000). These domains are designed to assist students in becoming responsible and contributing members to their society, nation, and world (Lian, Tse, & Li, 2007). Eight key learning areas have been designed to advance the school curriculum. These are: Chinese language education; English language education; personal, social, and humanities education; technology education; physical education; and arts education. Nine generic skills fall under the eight key learning areas. These nine skills include collaboration, communication, creativity, critical thinking, problem solving, information technology, numeracy, study, and self-management skills (Lian, Tse, & Li, 2007). This type of education reform is much different from that in the U.S. where non-academic skills are being pushed aside in order to "chase after test scores" (Zhao, 2006, p. 29).

Teacher Recruitment and Training

The population of students assessed and the chosen curriculum of countries have a great deal to do with the differences in assessment scores, but the teachers of those students must also be considered. Recruitment and training of teachers is critical to creating a high-quality and long lasting education system. Requirements and standards for preparing teachers differ greatly between countries and contribute to the ever growing dissatisfaction in both public and private education by parents and critics.

In the United States, teacher applicants can attend one of over 1,200 training schools or programs in colleges or universities. A decentralized education system, when compared to other nations, and the high number of training schools contribute to variances in curriculum and certification requirements. Individual states set the expected

levels of competency resulting in a lack of uniformity across states. Applicants can complete a teacher education program in a variety of ways. The most common is to obtain a bachelor's degree in education with receipt of a teaching certificate at completion. After obtaining a bachelor's degree in a field other than education, an applicant can join the teaching workforce by completing a "fifth-year" program, where a teaching certificate is received upon completion of a one year education program. Applicants can also obtain an alternative teaching license and postpone the completion of a formal education program to teach immediately (Ingersoll, 2007, Chapter 8).

Contrasting the United States, China's central government establishes the requirements and standards for teacher candidates. Teaching candidates are required to obtain a relevant degree or certificate to the desired grade level or subject. Candidates must also pass the Mandarin language test and acquire the knowledge to pass four special tests made up of pedagogy, psychology, teaching methods, and teaching ability. (Ingersoll, 2007, Chapter 2). Although Hong Kong is a part of The People's Republic of China, the requirements and standards are slightly different. Application to the Education and Manpower Bureau for registration as a "registered" teacher is confirmed by obtaining "qualified teacher" status, which indicates a candidate has completed an approved teacher education program offered by a recognized institution. A candidate can also register as a "permitted" teacher by obtaining minimum academic qualifications but not specific teacher-training skills. After acquiring the qualified teacher status, he or she will then be eligible to be a registered teacher. In 1997, the new chief executive of Hong Kong declared the standard that all new teachers should be degree or above graduates and receive professional training (Ingersoll, 2007, Chapter 3).

Japan differs from many of the other Asian nations in teacher preparation programs in that a national curriculum is in place. Obtaining a teaching job requires passing a series of tests determined by the prefectural board of education which may include written tests, interviews, proficiency tests, and an essay. A teaching certificate can be earned by graduating from a Ministry of Education accredited teacher training university, including completing all required credits for subject, pedagogical, and guidance courses. Applicants must also complete a three week practicum for all levels of certificates and a one week nursing-care internship for elementary and junior high certificates. Teacher training in Japan is primarily on-the-job and can be any of five different levels of extensive training. The five different levels are: the national level, the prefectural board of education level, the municipal board of education level, the school level, and the level consisting of voluntary educational associations, groups, and individual self-training (Ingersoll, 2007, Chapter 4). Even after gaining employment, teachers must complete a one-year probationary period followed by intensive teacher training in frequent and varied in-service programs. The prefectural level training programs are compulsory but local boards of education and training centers create ad hoc programs for teachers.

Perhaps the most noteworthy for teacher training and recruitment is Singapore. One of the top-ranked nations on national assessments, Singapore has consistently and actively recruited and trained teachers for over four decades. Recruitment, training, certification, teaching assignments, and placement in schools are all handled by the Ministry of Education (MOE). The MOE works in harmony with individual schools and the National Institute of Education (NIE) to meet the demands of keeping quality teachers

in schools. The Ministry also keeps open communication with teachers, parents, universities, businesses, and other government ministries to maintain a high level of qualifications above those of other countries. The centrally managed system of recruiting teachers and placing them in schools where the need is greatest helps prevent problems such as high turnover, shortages, under-qualification, and out-of-field teaching common to many other countries including the United States. The Ministry of Education collaborates with the NIE to define standards for academic qualifications, provide input into the teacher selection process, and to perform curriculum reviews that will continue to provide teachers with the most current knowledge and qualifications. The programs offered by the NIE consist of education studies, curriculum studies, language enhancement, and academic discourse and practicum. Interestingly, the NIE dedicates one-fourth of teacher education to the practicum (Ingersoll, 2007, Chapter 6).

Additionally, the Ministry of Education in Singapore conducts recruitment campaigns from the top one-third of university-degree holders and polytechnic school graduates twice per year to fill anticipated needs in the school system. Anyone that does not have proper training will be sponsored to receive training in one of three preparatory programs offered by the NIE. The programs are: Diploma in Education, Postgraduate Diploma in Education, and Bachelor of Arts/Science (Education). Singapore will continue to keep the bar set high as they move toward a post-secondary graduate only workforce, while promoting master's level degrees (Ingersoll, 2007, Chapter 6).

Table 4

Comparison of Teacher Training Practices by Country

Country	Teacher Training Practices
United States	Applicants can attend one of over 1,200 schools or programs creating variances in curriculum and certification requirements set by individual states.
Japan	There is a national curriculum is in place, and intensive teacher training continues after employment.
Singapore	The Ministry of Education collaborates with the National Institute of Education to define standards for academic qualification and curriculum reviews to provide teachers with current knowledge and qualifications.
China	Requirements and standards for teacher candidates are created by the central government.

Conclusion

Data derived from national assessments are at the core of reports describing the inferiority of American students as compared to their peers in foreign countries. Critics use these scores to emphasize how inadequately the United States measures up, but they fail to consider circumstances such as student populations, curriculum differences, and teacher training and recruitment. Although international evaluations do provide a great deal of information that can be used to improve performance, they do not supply a straight forward comparison of the United States and other countries.

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