A Piece of PISA

2018 PISA Sub-Group Data in Advocacy for Gifted Education

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ABSTRACT:
PISA International Test Scores have become an increasing influence on global education policy in the last two decades. The newest results for PISA 2018 were released in December, 2019. The educational research community has expressed concerns that PISA has negative as well as positive influences on educational policy. Viewpoints are based upon the economic lens of OECD, as opposed to the equity, socio-economic, and high stakes testing perspectives of the comparative education community. Positive evidence to support education policy can best be facilitated through emphasis on the wealth of subgroup data. Economic global publicity competitively uses rank on League Table scores to focus on a limited number of high scoring countries followed by larger samples of mediocre or low achiever results. This PISA overview emphasizes an awareness of valuable subgroup data that can policy makers can use to advocate for "Top Performers," which would related to Gifted and Talented students. With 79 countries participating in PISA 2018, examples suggest possible sample selection strategies, and high achieving subgroups that can easily be accessed and used in Gifted advocacy by policy makers. Increased PISA achievement by Top Performers can positively contribute to overall mean score improvement and have a positive effect on the country's education.

PISA 2018 (Programme for International Student Achievement) provides evidence to advocate for Gifted Education policy. The OECD (Organization for Economic Co-operation and Development) launched PISA international testing in the year 2000, and has completed 7 test cycles, every three years, in 2000, 2003, 2006, 2009, 2012, 2015, and 2018. Each cycle has added countries to participate, and for the 2018 cycle, 79 countries are divided into 37 OECD members and 42 non-OECD Partner" countries. "Over the past two decades, PISA has become the world's premier yardstick for comparing quality, equity and efficiency in learning outcomes across countries and an influential force for education reform." (OECD Vol. I 2019)

Approximately 600,000 15-year-olds sat for the 2-hour computer-delivered test. For each country, a two-stage sampling procedure first selected a representative sample of at least 150 schools, taking into account factors such as location, rural, town or city. In the second stage a limited number of roughly 42 15-year-old students were randomly selected from each school to sit for the assessment. Most countries assessed 4,000 to 8,000 students, with sampling weights to represent the entire PISA-eligible cohort. (OECD, Vol. I, 2019) The overwhelming wealth of PISA data is most frequently limited to competitive League Table rankings that publicize total mean scores in Reading, Math, and Science. Few communications outline the overall breadth and depth of the online PISA database. There are valuable sub-score tables that analyze "Top Performers" with the highest proficiency levels 5 and 6 in Reading, Math and Science. PISA's sub-group gender differences also support goals to reduce barriers to girls as "Top Performers," especially in STEM. PISA subgroup data can support any number of policy initiatives in education, including Gifted and Talented Education.

Pisa 2018 READING FOCUS

PISA 2018 reports results in Reading, Math, and Science, with the 2018 major focus in Reading. Reading literacy included digital literacy. Trends in reading literacy were also reported over the past two decades. Around 8.7% of students, across OECD countries, were top performers in reading. In 20 education systems, over 10% were

top performers. At Proficiency Levels 5 and 6, students are able to comprehend lengthy texts, and deal with concepts that are abstract or counterintuitive. They can establish distinctions between fact and opinion, based on implicit cues pertaining to the content or source of the information (OECD, 2019)

In additional to Proficiency Levels, PISA also has valuable subgroup data defining Reading curriculum in Content and Cognition: Cognitive process subscales are: Locate information, Understand, and Evaluate and reflect. Text structure subscales are Single and Multiple text. Description of Proficiency Levels in Math and Science, also provide useful standards for advanced curriculum development,

PISA 2018 OVERALL RANKINGS MEAN SCORES IN IN READING, MATH AND SCIENCE

Each three year cycle of PISA testing has a specific focus, with 2012 Math, 2015 Science, and 2018 Reading. Each cycle has overall results in each subject, but the specific year in focus has more in-depth sub-group data related to content, concepts and participant questionnaires. When results are shown for each subject, the subject in focus is generally noted first, which, in the case of 2018, is READING, followed by the repeated sequence of MATH and SCIENCE.

PISA TESTING GLOBAL CONCERNS

When PISA rankings are published as League Tables, the publication will generally note a country's rank in each subject area. For example in PISA 2018, the United States is noted as (1) Reading, Rank 13th, (2) Math, Rank 37th, (3) Science, Rank 18th. This is an example of an internationally high profile country where rankings and scores are indicated as mediocre at best, and not in line with higher U.S. international rankings in other areas like economics or sports. PISA rankings are often a source of great transnational esteem in the context of education, but with 79 countries participating, more of the PISA rankings actually reflect a mediocre or low profile.

Academic literature related to PISA often claims discrepancies and flaws in the testing process, and scores are showcased only in a positive light for the top-scoring countries. Also, at times, results may only describe one rank, which would then be derived by averaging of the mean scores from the three subject tests. In looking at the mean score variance for the United States, one can see a weak U.S. average mean across Reading, Math and Science. PISA critics debate the philosophical, political, economic, and educational barriers that manifest limitations in validity of PISA's league tables in global education research and discourse. Cautionary validity has been increasingly addressed in PISA international research that bridges the fields of comparative and gifted education. A formal concern was directed to the OECD from a large group of academics regarding the detrimental effects of overemphasis on educational testing. (Guardian, 2014). Therefore, use of PISA results requires a balanced viewpoint with diplomacy in design for controls and data. PISA has regularly increased emphasis on issues in equity and socioeconomic factors.

Limitations are recognized in causality related to PISA scores. Reference is made to the 2018 report from the U. S. National Academy of Education, "International Education Assessments – Cautions, Conundrums, and Common Sense." Valid areas of caution include (1) design, (2) sampling, (3) survey development, (4) computer-based assessment, (5) analyses, (6) reporting, (7) interpretation, (8) policy uses, and (9) limitations. (Singer, 2018)

A few countries in the past PISA cycles have been tested by region, and those analyses provide results that address concerns related to different areas of countries not being properly represented in the total mean achievement or rank of the

country. PISA 2015 had regional results for Canada, Spain and 3 States in the U.S.

PISA 2018 regional results include::

(A) Belgium 3 `	(G) Argentina 4
(B) Canada 10	(H) Brazil 5
(C) Colombia 1	(I) Indonesia 2
(D) Italy 4	(J) Kazakhstan 14
(E) Spain 19	(K) Russia 2
(F) United Kingdom 4	

Also, the Chinese sample is listed as China B-S-J-Z, standing for the test sample from cities of Beijing, Shanghai, Jiangsu, and Zhejiang. With China scoring high in all subjects, there is continued concern that scores may be inflated due to the larger urban populations in their four city sample.

PISA 2018 - LEAGUE TABLES

Online published PISA results show ranking in League Tables, with Total Mean score for each country in Reading, Math and Science, and grouped into OECD and Partner countries. Some publications may only report data based on ranking "of OECD countries," and by including only OECD countries the rank of most countries is higher. Highest scoring countries are from Asia, with only Japan and Korea as members of OECD. The initial step in reviewing PISA 2018 lists mean scores for each of the countries by subject area, with the results in order of READING, MATHEMATICS, AND SCIENCE.

PISA ANALYSES – SAMPLE SELECTION

In reviewing PISA's complete list of 79 countries, it is an overwhelming task. Results for PISA are divided into quartiles as well as percentiles, and countries in a sample are generally compared to the top ranking countries. In Math and Science, seven of the top ten countries are from East Asia, and five of the top ten countries in Reading are likewise East Asian. If the countries targeted for comparison are from Europe or North America, for example, using the top ten for the sample would be limited to 5 or 7 Asian countries, plus 3 to 5 of the European countries of Estonia, Finland, Ireland, Netherlands, and Poland, plus Canada. For the purpose of addressing the major European audience of this newsletter, there needs to be selection criteria containing more countries from Europe. Therefore a better sample would include the Top quartile of 20 countries.

GEOGRAPHICAL GROUPINGS

Geographical PISA groupings could include:

- Western Europe
- Eastern Europe
- Scandinavia
- Eastern Mediterranean
- Middle East
- North and Latin America
- Oceania,
- Africa
- Asia

Geographical groupings reduce the sample countries to a reasonable number for descriptive and multivariate statistical analyses. Groupings may also compare members of relevant organizations:

- G7
- European Union
- ECHA European Council High Ability
- World Giftedness Centre
- European Talent Network Centers.
- WCGTC World Council for Gifted & Talented Children

ETNS EUROPEAN TALENT SUPPORT NETWORK – SAMPLE SELECTION

For the benefit of ETNS audience, the following sampling procedure will be demonstrated. (1) A list will be selected that includes the top quartile (top 20) for each of the three tests. (2) From the top quartile list, the countries from Europe will be selected for comparison, thereby defining the comparative sample of "European Countries ranking in PISA top quartile for Reading, Mathematics, or Science."

Subgroup comparisons that would be most meaningful for the members of the World Giftedness Center would include comparisons of the 21 members of the European Talent Support Network and

percent of top performers in reading, math, science, By the first half of 2019 the ETSN had 25 centers of which 21 were in European and 4 in non-European countries. The European centers provide a justifiable sample for further analysis, yet would omit six of the higher ranking European countries that do not have ETSN centers: Estonia, Finland, Poland, United Kingdom, Sweden, and Norway. Also, some of the ETSN countries are not part of the top quartile sample: Austria, Czech Republic, Greece, Lithuania, Hungary, Italy, and Slovakia.

VOLUME I – What Students Know and Can Do

One of the most valuable sub-group scores related to Gifted and Talented education is the Proficiency Level Scores from PISA. There are seven Proficiency Levels, with below Level 2 designated as Low Performers, and Levels 5 and 6 designated as Top Performers. The Top Performer results are indicated in percent of total students scoring above Level 5, and this group would correlate well with Gifted. Yet "Gifted" is never used in PISA. The less elitist term used is "Top Performer."

ACHIEVEMENT GAP

Differences between Top Performers and Low Achievers provide important descriptive statistics related to the Achievement Gap.

VOLUME II – Where All Students Can Succeed

United Nations Sustainable Development Goal 4, Agenda 2030, ensures that nations achieve equitable quality education, and promote lifelong learning opportunities for all. Equity does not mean equal outcomes, but that variations are not related to student background, including socio-economic status, gender or immigrant background. Overall, PISA 2018 results state that "all countries still have some way to go towards reaching the global goal for quality education." (OECD, Vol. II)

SOCIOECONOMIC DISPARITIES

The level of economic development explains 28% variation in learning outcomes. Despite socio-economic disadvantage, some students can attain high levels of academic proficiency. Across OECD countries one in ten disadvantaged students was able to score in the top quarter of reading performance, indicating "disadvantage is not destiny." Across OECD countries, 40% of teachers in disadvantaged schools have at least a Master's degree, compared with 48% of teachers in advantaged schools. Disadvantaged schools are more likely hindered by shortage of education staff and limited education resources. (OECD, Vol. II)

GENDER GAPS

READING – In all countries, girls significantly outperformed boys in reading.
MATHEMATICS – Boys outperformed girls in mathematics in all but 12 countries.
SCIENCE – Less Gender Difference
Gender Gap is wider among Top Performers. Girls expressed greater fear of failure, and there is gender difference in types of STEM career expectations.

IMMIGRANT & NON-IMMIGRANT

Immigrant background across OECD countries has increased from 10% in 2009 to 13% in 2018. In most countries, immigrant students tend to be socio-economically disadvantaged. Around 2 in 10 immigrant students scored in the top quarter in reading. Many immigrant students report a goal-oriented attitude.

VOLUME III – What School Life Means for Students' Lives

BELIEF IN GROWTH MINDSET

Majority disagreed that intelligence is something you can't change very much.

TEACHER ATTITUDE & PRACTICE

Positive results for teacher stimulation of reading, and greater support from teachers,

PARENT INVOLVEMENT
Parents emphasized school safety, school climate, reputation, academic achievement.

SCHOOL CLIMATE
Student sense of belonging: cooperation (62%) was more prevalent than competition (50%). No clear relationship between competitiveness and student performance.

STUDENT WELL-BEING
More than 80% feel happy, cheerful, joyful, and lively. 6% reported always feeling sad. Peers play pre-eminent role in social lives. Three Main student aspects: (1) way they look, (2) relationships with parents, (3) life at school. Additional subscale data in Volume I include Digital devices at home, Reading Habits, Attitudes Towards Reading, and Time Spent Using the Internet.

SCHOOL MISBEHAVIOUR
23% bullied at least few times a month. 88% agreed wrong to join in bullying. Those not bullied report stronger anti-bullying attitudes. Attendance is a factor.

CONCLUSION

PISA is a complex Large-Scale International Testing program that has been growing in global influence since its first 3 YEAR testing cycle began in 2000. Extensive questionnaire data has also become an important component of PISA. Throughout the results, there are valuable subgroups with data that would especially relate to students who are Gifted and Talented. With the broad global landscape of PISA, no reference is made to the term "Gifted," however, the PISA term of "Top Performer" is regularly woven into the subgroup data, results and conclusions.

There is an attempt in this article to present a broad overview of PISA, to address varied knowledge of the PISA effect on global education. There is also a strong voice in the academic community of education that has continued to express reservations about the validity and subsequent global influence of PISA. With OECD's administration of PISA, there is concern that the international benefits are more related to the global economic landscape, rather than the philosophical purpose of education as nurturing lifelong learners. The competitive League Table results are also translated into critical policy decisions based on global economic drivers. Use of PISA subgroup data provides less emphasis on broad competitive policy, and more focus on the depth of factors related to educational reform. Specific PISA subgroup data may be an evidence-based resource for policy. Advocacy for Top Performing students is an investment in the wealth of educational potential within each country.

References:

Guardian Staff. (May 06, 2014). OECD and Pisa tests are damaging education worldwide – Academics. United Kingdom: The Guardian.

OECD (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do,* PISA, OECE Publishing, Paris, http://doi.org/10.1787/5f07c754-en

OECD (2019), *PISA 2018 Results (Volume II): Where All Students Can Succeed,* PISA, OECD Publishing, Paris, http://doi.org/10.1787/b5fd1b8f-en

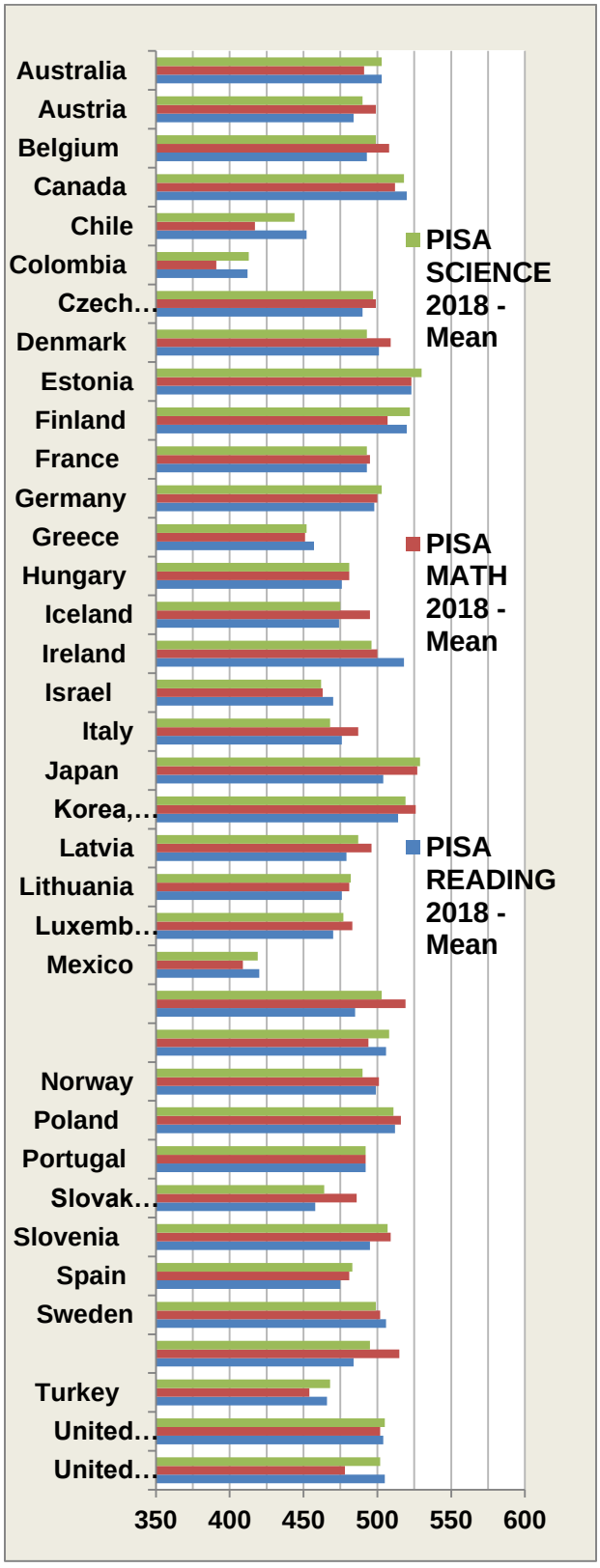
OECD (2019), *PISA 2018 Results (Volume III): What School Life Means for Students' Lives,* PISA, OECD Publishing, Paris, https://doi.org/10.1787/acd78851-en.

Singer, J. D., Braun, H. I., & Chudowsky, N. (2018). *International education assessments: Cautions, conundrums, and common sense.* Washington, DC: National Academy of Education.

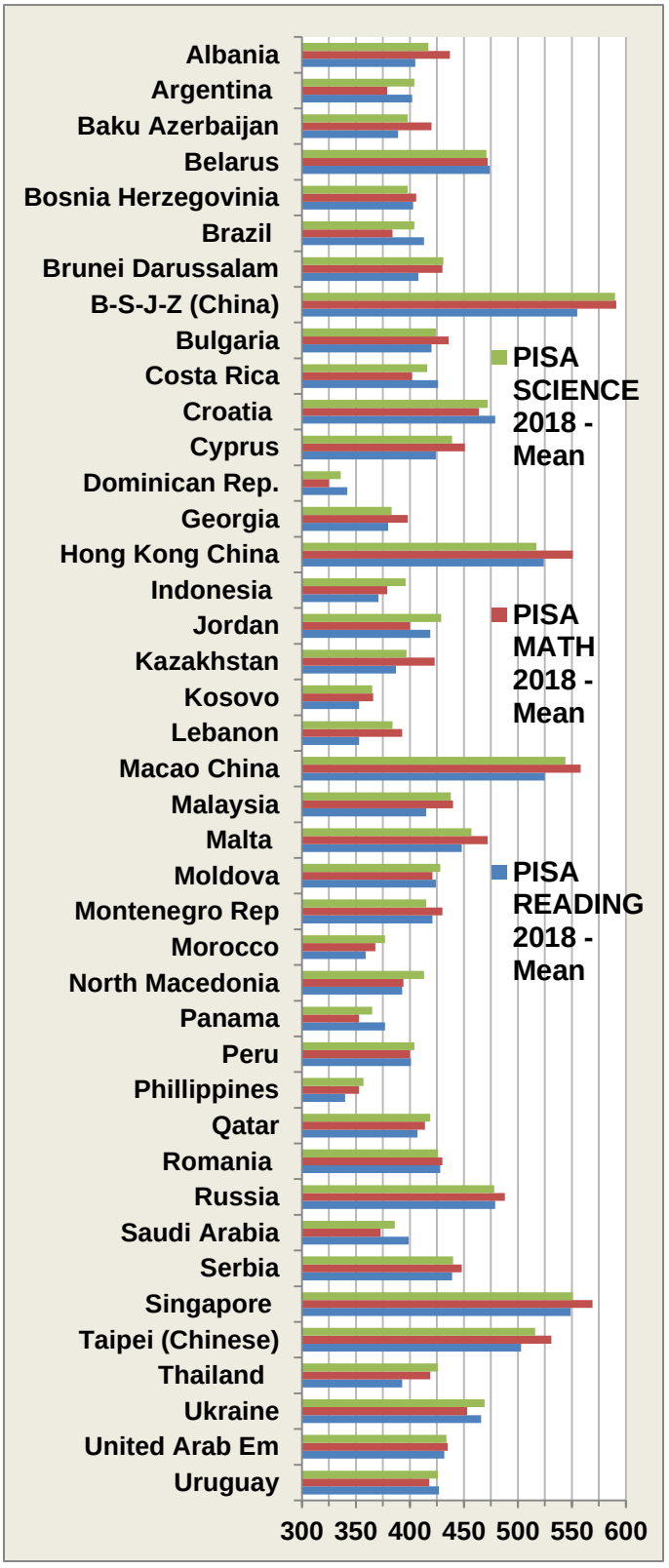
PISA ONLINE ACCESS: (Free Download)

https://www.oecd.org/pisa/publications/pisa-2018-results.htm

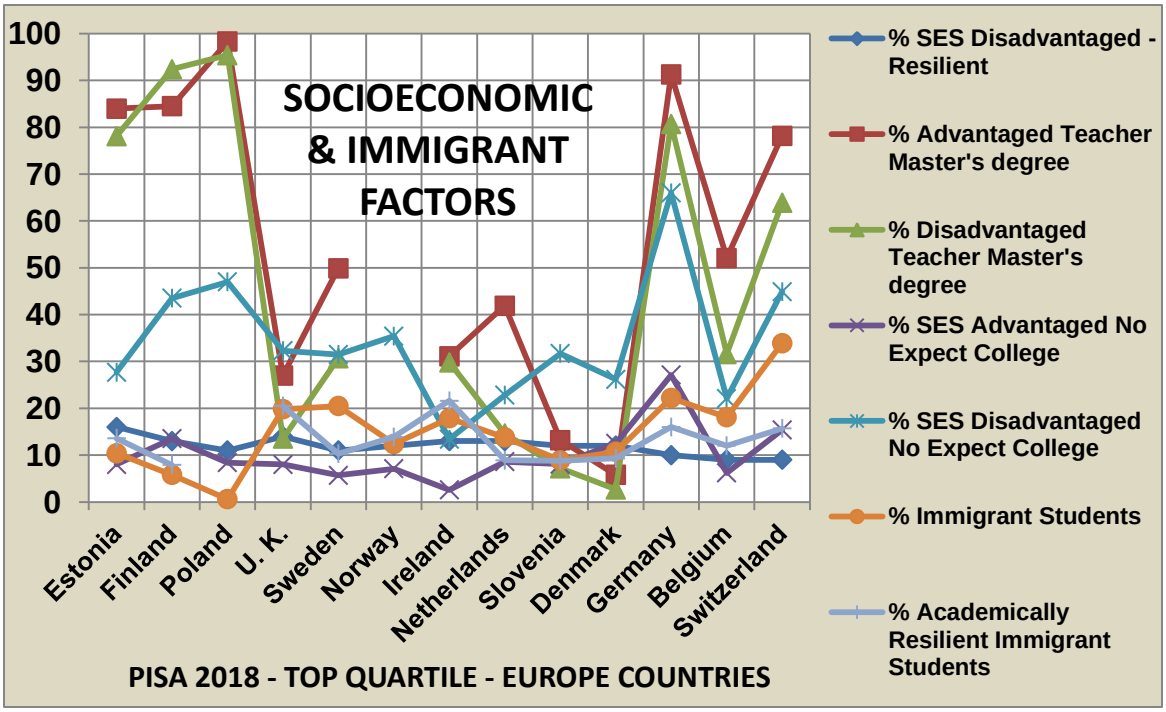
OECD COUNTRIES (N = 37)



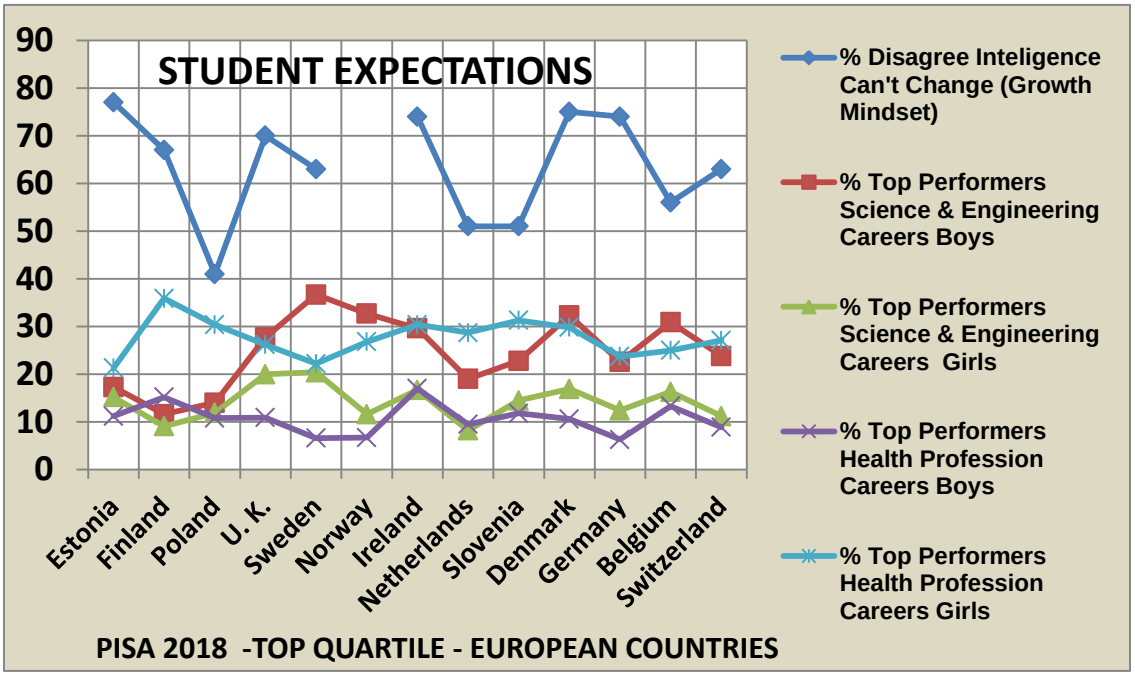
NON-OECD PARTNERS (N = 42)



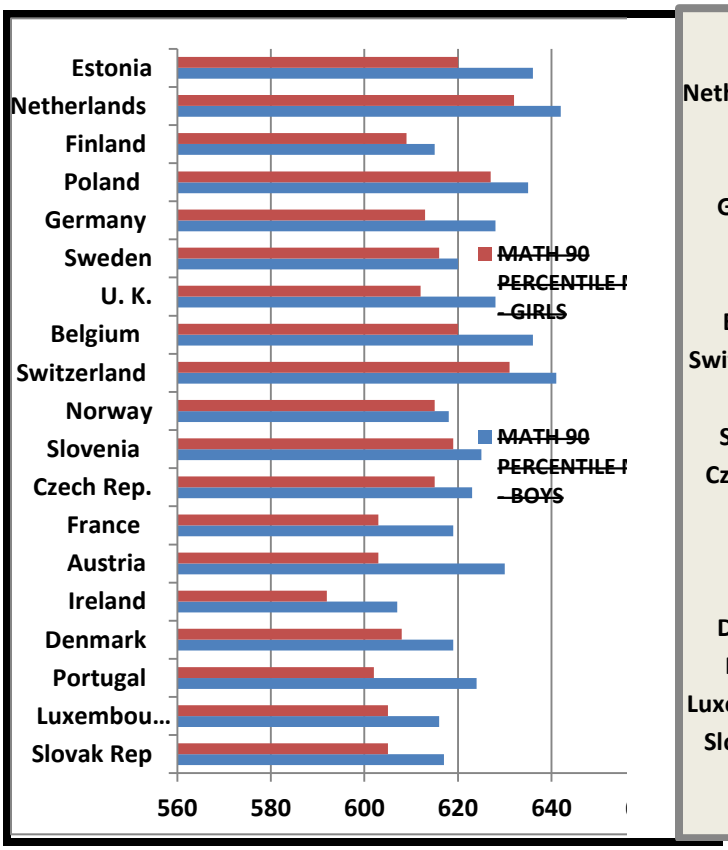
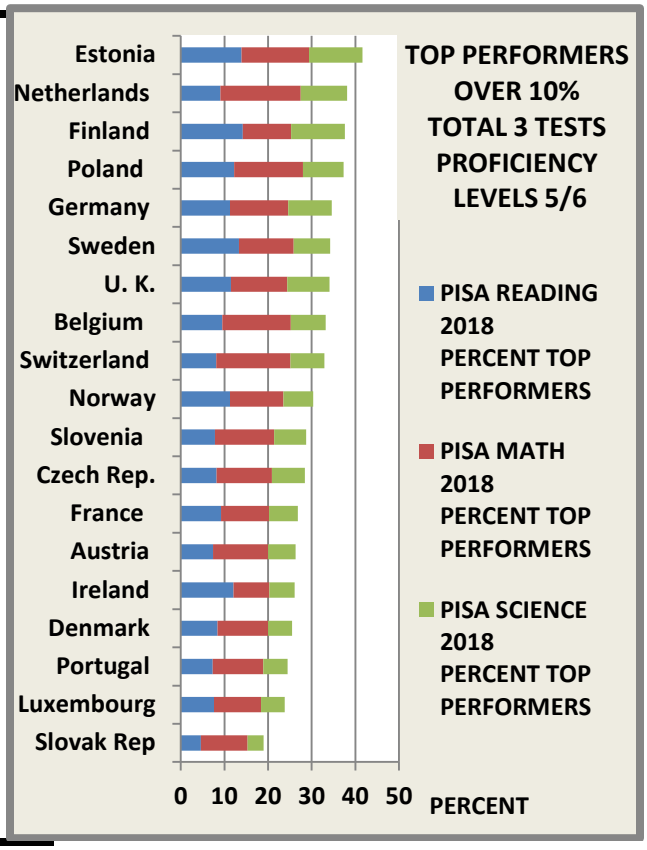
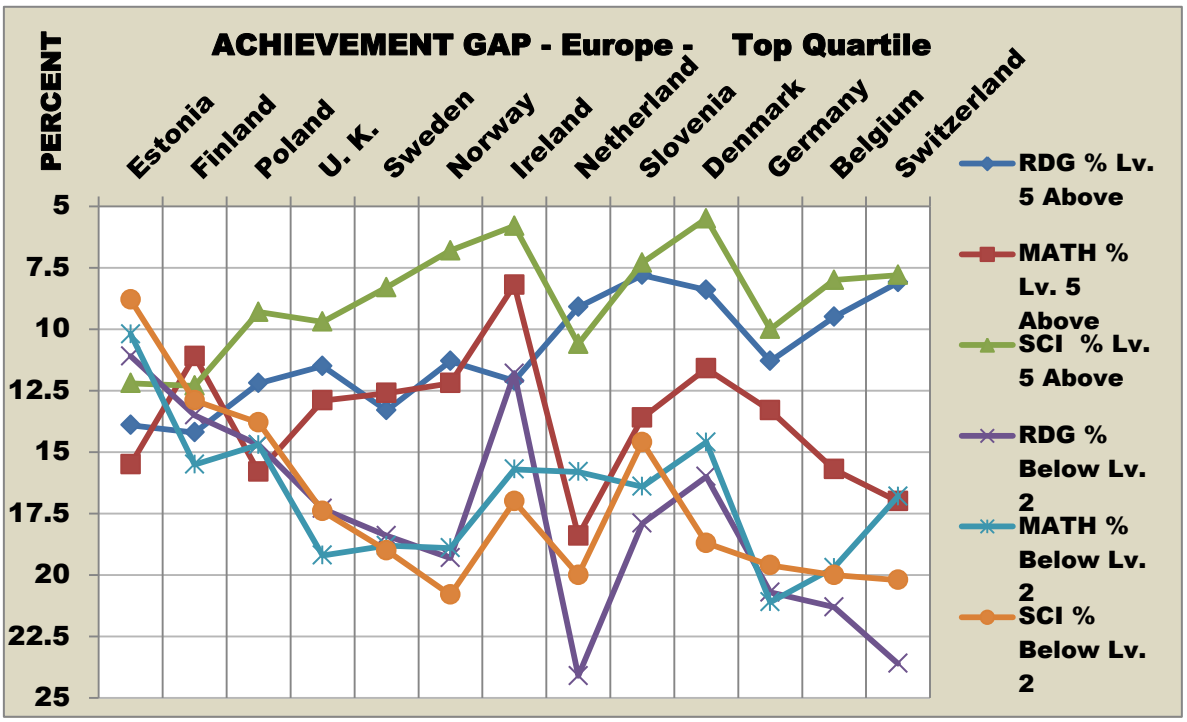
PISA 2018 – VOLUME II – WHERE ALL STUDENTS CAN SUCCEED – Sample Data



PISA 2018 – VOLUME III – WHAT SCHOOL LIFE MEANS FOR STUDENTS' LIVES – Sample Data



PISA 2018 – MATH 90th PERCENTILE
Difference Between Boys and Girls



PISA 2018 – READING, MATH, SCIENCE
PERCENT OF TOP PERFORMERS