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CUHK Releases Students' Results in Computer-based Assessment of Collaborative Problem Solving in PISA 2015

In an international computer-based assessment of the competence of students to solve problems collaboratively, Hong Kong comes third out of 52 countries and economies, behind Singapore and Japan. This is a finding of the Computer-based Assessment (CBA) of **Collaborative Problem Solving**, part of the Programme for International Student Assessment (PISA) 2015, released today (21 November) by the Hong Kong Centre for International Student Assessment (HKCISA) of the Institute of Educational Research at The Chinese University of Hong Kong (CUHK).

The HKCISA released the CBA to reveal how competent Hong Kong students are in using digital technologies and online information to solve problems collaboratively. This is against a background of widespread concern over the opportunities and challenges brought about by the coming of the information age and the expansion of the internet to the field of education.

The results of PISA 2015 on students' performance in CBA in reading, mathematics and science were released in December 2016. From April to May 2015, 1,600 students aged 15 from 138 schools were randomly selected for the CBA of Collaborative Problem Solving. They were requested to solve problems by searching and exploring interactive simulations produced by a computer programme. Their parents and schools were also requested to provide background information through questionnaires.

Survey results

About 125,000 students from 52 countries and economies participated in the CBA of Collaborative Problem Solving. Hong Kong students rank third (Figure 1) and attain an average score of 541, lagging behind students in Singapore (561) and Japan (522), and on a par with students in Korea (538), Canada (535), Estonia (535) and Finland (534). They outperform students in other Chinese societies including Macao (534), Chinese Taipei (527) and the four regions of Mainland China (496).

Among the five levels of CBA Collaborative Problem Solving scale, level 4 is the top level while below level 1 is the lowest level (Figure 2). Results show that 13.0% of Hong Kong students reach level 4, outperforming the average of 7.9% of the Organisation for Economic Co-operation and Development (OECD). This percentage is lower than that of Singapore (21.4%) and Japan (14.0%), but higher than that of Korea (10.4%) (Figure 3). On the other hand, 13.7% of Hong Kong students perform at level 1 and below, which is lower than the OECD average of 28.1% but higher than Japan (10.1%) and Singapore (11.4%) (Figure 4).

Family factors and student characteristics

Students' socio-economic status, including the occupation and education level of their parents, has a relatively small impact on their performance. The socio-economic gradient of Hong Kong is 14, which is much lower than the OECD average of 30 (Figure 5 and 6). Yet significant differences in gender and immigrant status are still evident in student performance. In all participating countries and economies, girls outperform boys in Collaborative Problem Solving. Hong Kong girls outperform boys significantly by 36 points. The performance of native students is significantly higher than that of first- and second-generation immigrant students, with a difference of up to 18 and 11 points.

Attitudes towards Collaborative Problem Solving

The Student Questionnaire of PISA 2015 measures two dimensions of attitudes towards Collaborative Problem Solving: (1) Valuing relationships and (2) Valuing teamwork (Figure 7). The index of valuing relationships for Hong Kong students is -0.04, and their index of valuing teamwork is 0.05 (Figure 8). Overall, Hong Kong students' indices of attitudes towards Collaborative Problem Solving are similar to the OECD average. As for gender difference, girls have a higher index of valuing relationships than boys, whereas boys have a higher index of valuing teamwork than girls in most of the participating countries and economies. In Hong Kong, no gender differences are found in these two dimensions of attitudes.

Similar to students in OECD countries, Hong Kong students' attitude to valuing relationships has a positive relationship with Collaborative Problem Solving performance (Figure 9). The more students perceive that "I am a good listener", "I enjoy considering different perspectives" and "I take into account what others are interested in", the higher their Collaborative Problem Solving ability. However, Hong Kong students' attitude to valuing teamwork has a negative relationship with Collaborative Problem Solving performance. The more students perceive that "I find that teamwork raises my own efficiency", the lower their Collaborative Problem Solving ability.

Information and communication technology resources in family

The study analyses the impact of availability of information and communication technologies (ICT) resources in the family on Hong Kong students' performance. A great majority of students (93%) have access to computers and internet at home. Results show that students who have access to computers at home, including desktop computers, notebook computers and tablet computers, outperform significantly those without (7%) by 40 points in CBA Collaborative Problem Solving, a finding which is similar to that of Individual Problem Solving in PISA 2012. In view of the strong negative impact of lack of computers at home on students' learning, the Government should provide support and appropriate ICT resources for students of these families.

Online activities and Collaborative Problem Solving performance

PISA analyses the relationship between various online activities and Collaborative

Problem Solving performance. Results show that students who sometimes engage in online activities outside school for fun or schoolwork have a better performance in Collaborative Problem Solving than those who do so every day or who never do so (Figure 10). These activities include browsing the internet for schoolwork, reading news on the internet, and obtaining practical information from the internet. Yet students' internet use in school for schoolwork has a negative relationship with Collaborative Problem Solving performance. This may be because students who need to use internet in school are the disadvantaged students who cannot afford ICT facilities at home.

About PISA

Initiated by OECD, PISA is a triennial international study, with the aim of comparing and evaluating the effectiveness of education systems of the participating countries and economies by assessing how well 15-year-olds have acquired the knowledge and skills essential for participation in society.

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Figure 1. Student Performance in CBA Collaborative Problem Solving in PISA 2015

CBA Collaborative Problem Solving		
Country/Economies	Mean	S.E.
Singapore	561	(1.2)
Japan	552	(2.7)
Hong Kong-China	541	(2.9)
Korea	538	(2.5)
Canada	535	(2.3)
Estonia	535	(2.5)
Finland	534	(2.6)
Macao-China	534	(1.2)
New Zealand	533	(2.4)
Australia	531	(1.9)
Chinese Taipei	527	(2.5)
Germany	525	(2.8)
United States	520	(3.6)
Denmark	520	(2.5)
United Kingdom	519	(2.7)
Netherlands	518	(2.4)
Sweden	510	(3.4)
Austria	509	(2.6)
Norway	502	(2.5)
Slovenia	502	(1.8)
Belgium	501	(2.4)
Iceland	499	(2.3)
Czech Republic	499	(2.2)
Portugal	498	(2.6)
Spain	496	(2.1)
China (B-S-J-G)	496	(4.0)
France	494	(2.4)
Luxembourg	491	(1.5)
Latvia	485	(2.3)
Italy	478	(2.5)
Russian Federation	473	(3.4)
Croatia	473	(2.5)
Hungary	472	(2.4)
Israel	469	(3.6)
Lithuania	467	(2.5)
Slovak Republic	463	(2.4)
Greece	459	(3.6)
Chile	457	(2.7)
Cyprus	444	(1.7)
Bulgaria	444	(3.9)
Uruguay	443	(2.3)
Costa Rica	441	(2.4)
Malaysia	440	(3.3)
Thailand	436	(3.5)
United Arab Emirates	435	(2.4)
Mexico	433	(2.5)
Colombia	429	(2.3)
Turkey	422	(3.4)
Peru	418	(2.5)
Montenegro	416	(1.3)
Brazil	412	(2.3)
Tunisia	382	(1.9)
<i>OECD average</i>	500	(0.5)

Note: Shaded area indicates scores significantly different from that of Hong Kong. The four participating regions of Mainland China are Beijing, Shanghai, Jiangsu, and Guangdong.

Figure 2. Distribution of Students at Each Proficiency Level of the CBA Collaborative Problem Solving Scale (Hong Kong versus OECD Average)

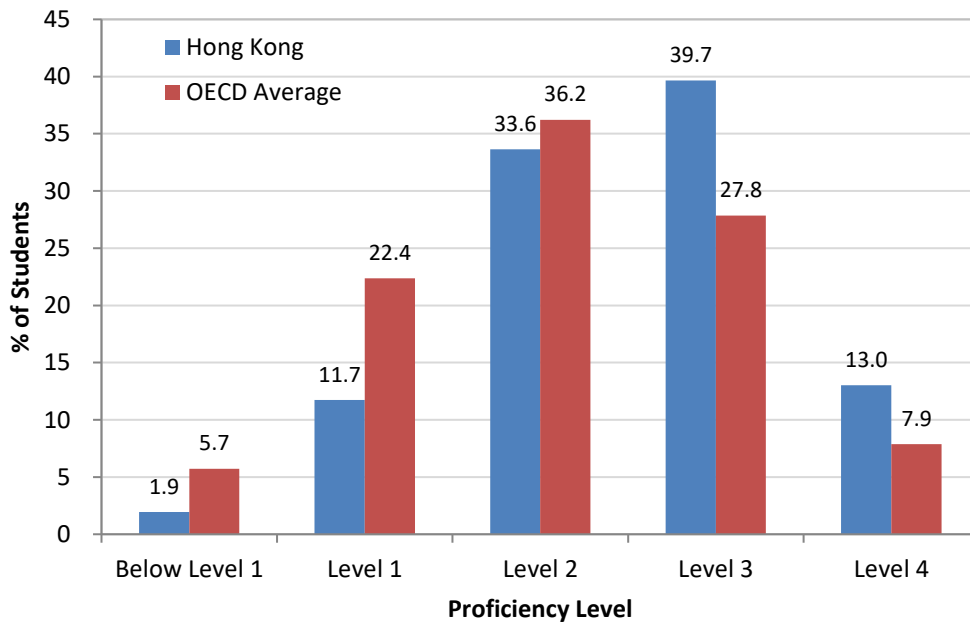


Figure 3. Percentage of Students Attaining Level 4 in CBA Collaborative Problem Solving in Top Ten Countries/Economies

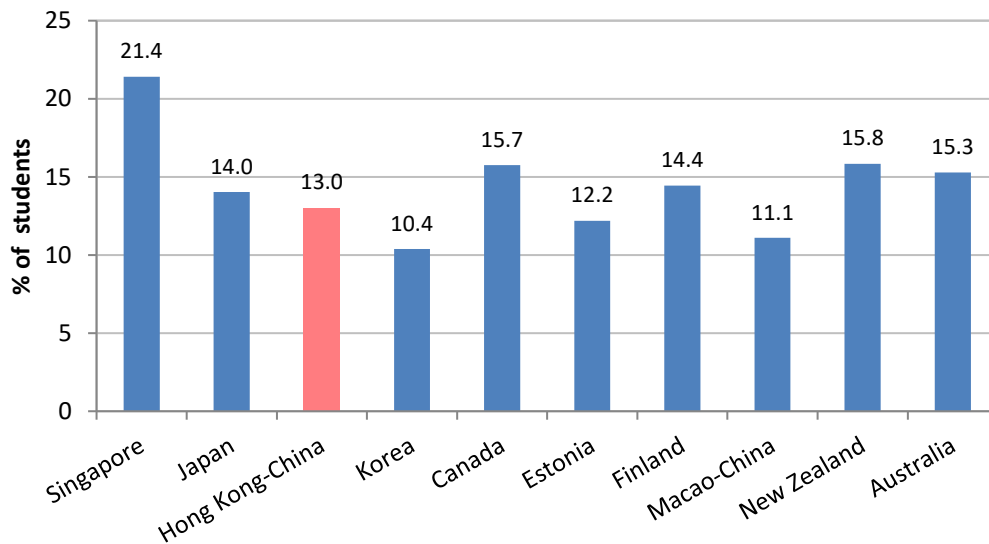


Figure 4. Percentage of Students Attaining Level 1 and below in CBA Collaborative Problem Solving in Top Ten Countries/Economies

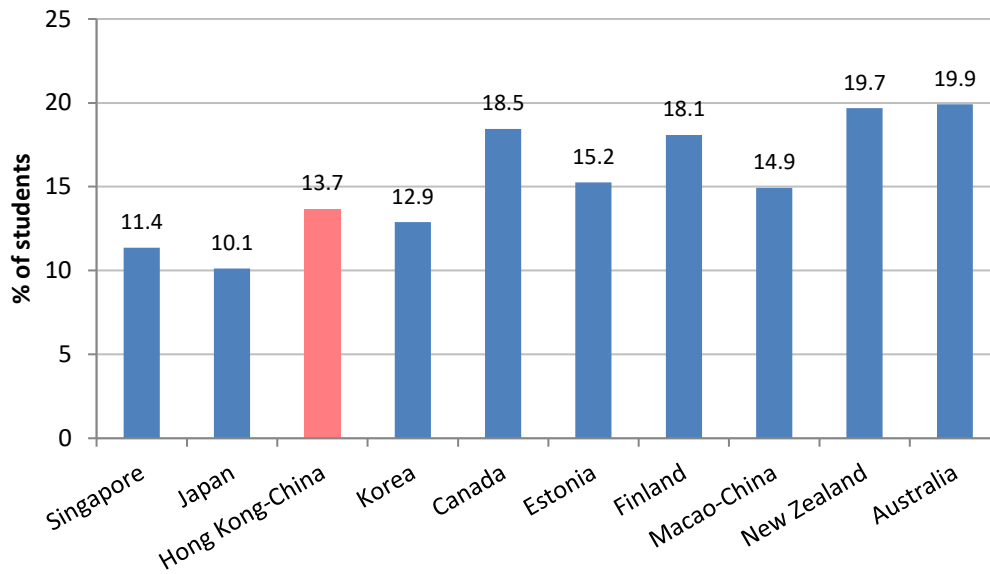
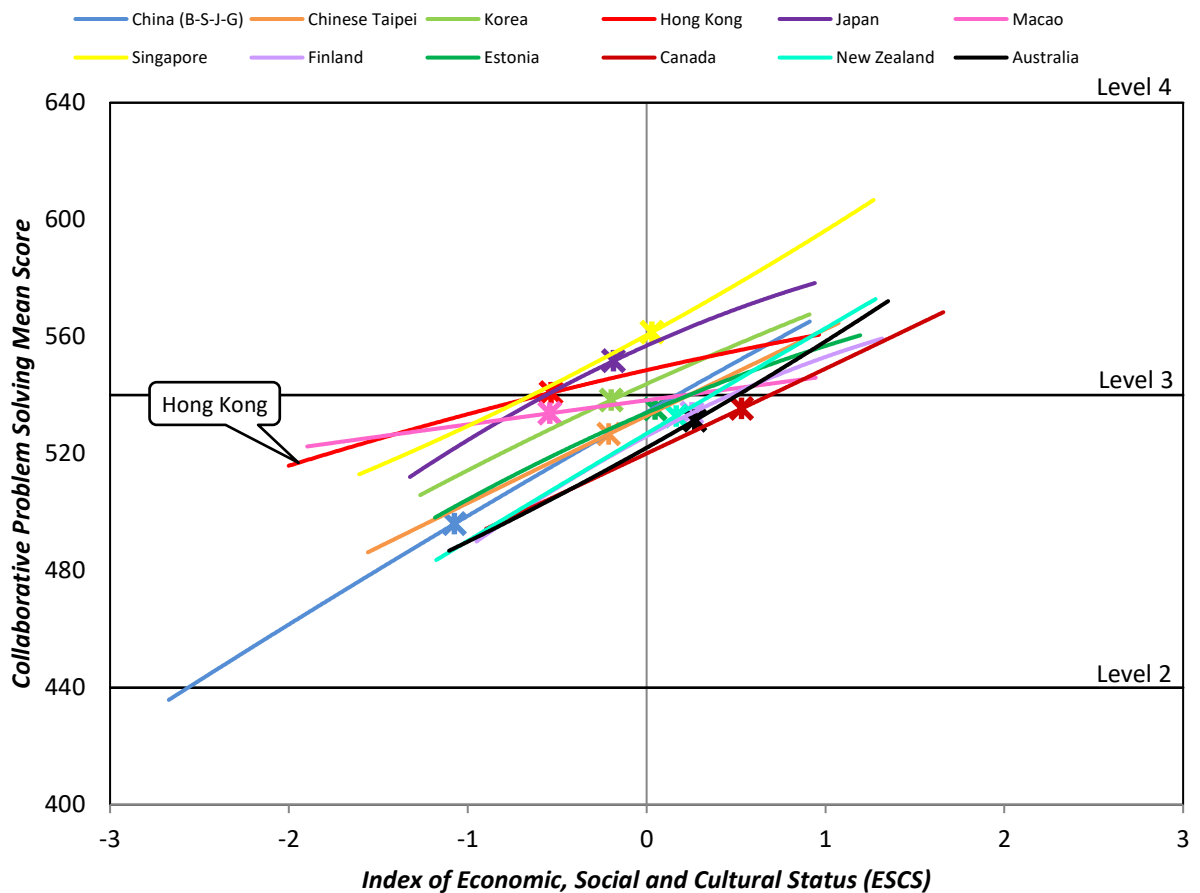
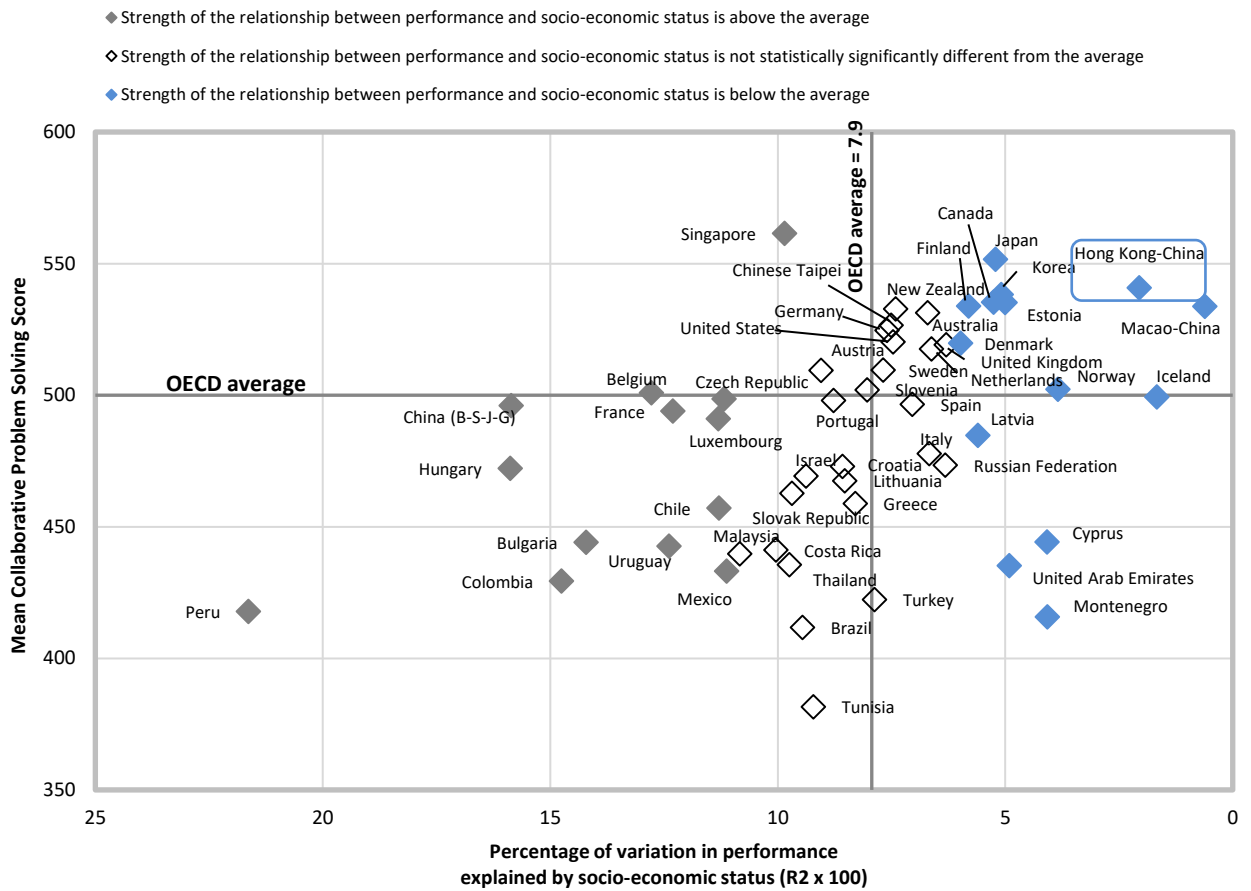


Figure 5. Relationship between Student Performance in CBA Collaborative Problem Solving and ESCS in Twelve Countries/Economies



Note: The four participating regions of Mainland China are Beijing, Shanghai, Jiangsu, and Guangdong.

Figure 6. Performance in CBA Collaborative Problem Solving and the Impact of Socio-economic Background



Note: The four participating regions of Mainland China are Beijing, Shanghai, Jiangsu, and Guangdong.

Figure 7. Attitudes towards Collaborative Problem Solving: Valuing Relationships and Valuing Teamwork (Percentages of Agree or Strongly Agree)

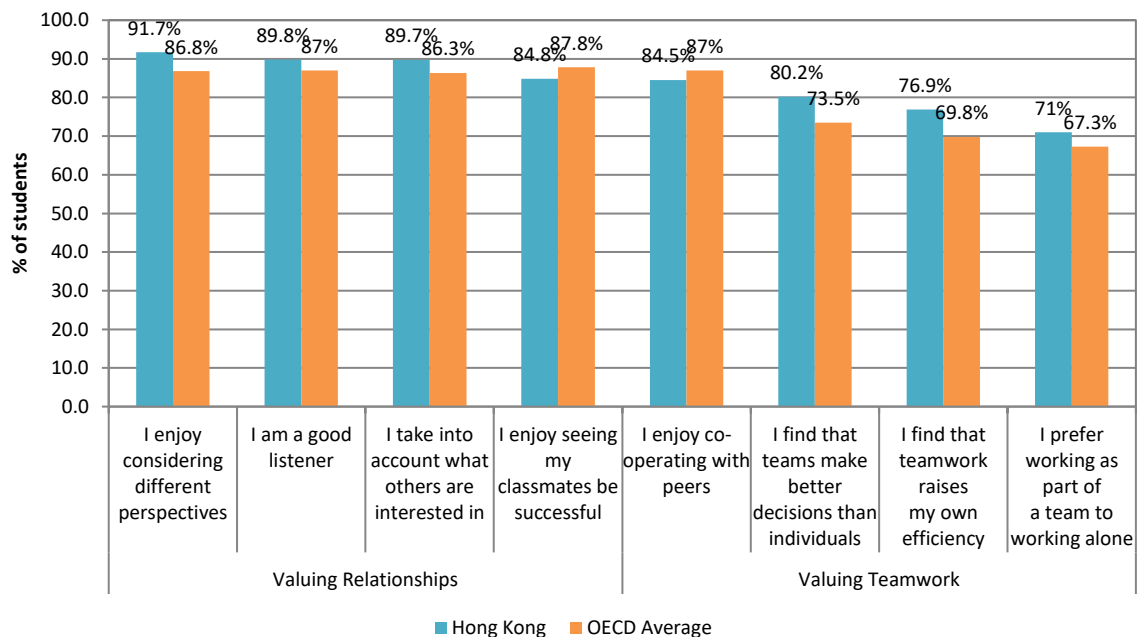
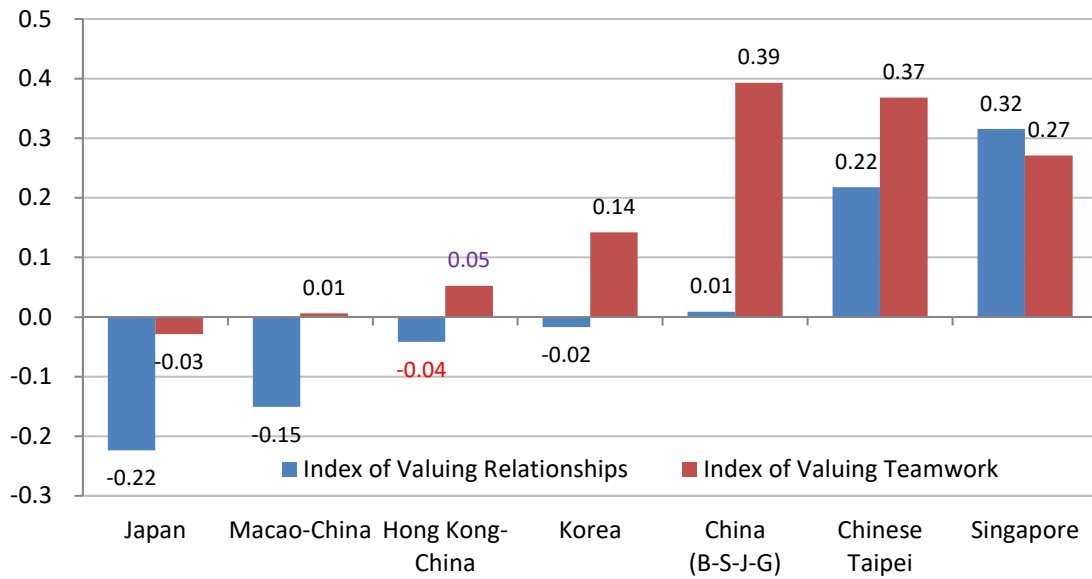


Figure 8. Indices of Valuing Relationships and Valuing Teamwork towards Collaborative Problem Solving of Students in East Asian Societies



- Note: 1. The OECD average is 0.00
 2. Valuing Relationships refers to the altruistic attitude held when engaging in collaborative activities not for his or her own benefit.
 3. Valuing Teamwork refers to the emphasis put on what teamwork, as opposed to working alone, can produce.

Figure 9. Relationship between Valuing Relationships and Valuing Teamwork and Collaborative Problem Solving Performance of Hong Kong Students

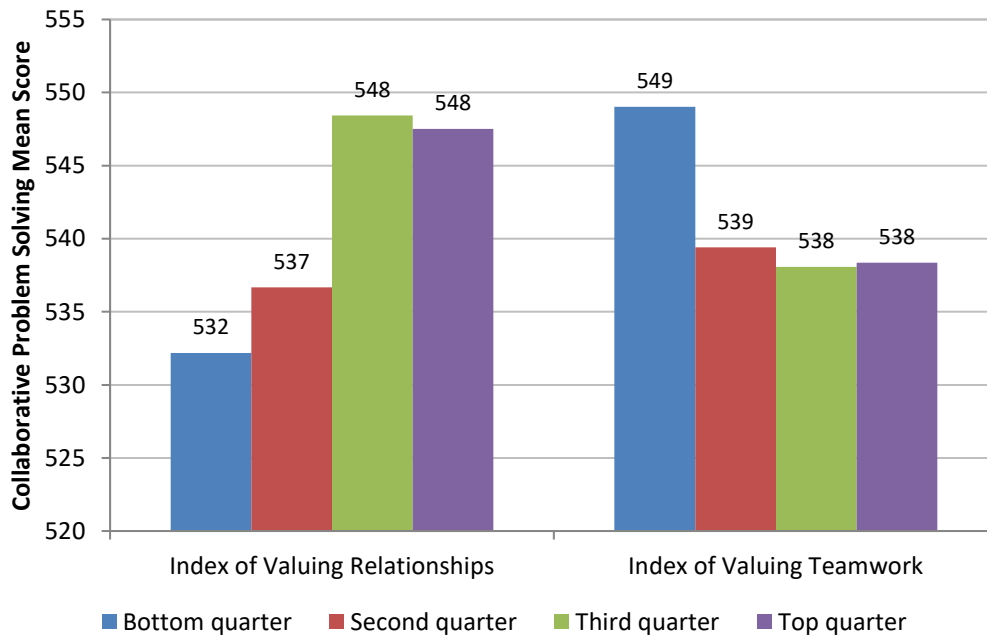


Figure 10. Relationship between Online Activities in and outside School and CBA Collaborative Problem Solving Performance of Hong Kong Students

