

# CoolThink@JC International Conference on Computational Thinking Education 2020

19 - 21 August 2020



Computational Thinking Education

## Conference Programme Handbook

Created and Funded by



香港賽馬會慈善信託基金  
The Hong Kong Jockey Club Charities Trust  
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香港教育大學  
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of Hong Kong



Massachusetts  
Institute of  
Technology



香港城市大學  
City University of Hong Kong



**CoolThink@JC**

**Programme Handbook of International Conference on  
Computational Thinking Education 2020 (CTE2020)**

**19-21 August 2020**

**The Education University of Hong Kong, Hong Kong**

**Funded and Created by**

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The Education University of Hong Kong

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City University of Hong Kong

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# Table of Contents

i.	<i>Preface</i> .....	1
ii.	<i>Conference Organisation</i> .....	9
iii.	<i>Programme Overview</i> .....	17
iv.	<i>Programme Schedule</i> .....	18
v.	<i>Keynote and Invited Speeches</i> .....	28
vi.	<i>International Forum on Professional Development of Teacher for Practicing Computational Thinking Education in K-12</i> .....	41
vii.	<i>International Forum on Implementation of Computational Thinking Education in K-12</i> .....	42
viii.	<i>Workshop on Learning Analytics for Supporting and Developing Computational Thinking Education</i> .....	43
ix.	<i>CTE-STEM2021</i> .....	45

## *i. Preface*

International Conference on Computational Thinking Education 2020 (CTE2020) is the fourth international conference organized by CoolThink@JC, which is created and funded by The Hong Kong Jockey Club Charities Trust, and co-created by The Education University of Hong Kong, Massachusetts Institute of Technology, and City University of Hong Kong.

CoolThink@JC strives to inspire the digital creativity among students and nurture their proactive use of technologies for social good from a young age. In collaboration with the world's leading experts and local educators, CoolThink@JC empowers teachers with high-quality teaching materials, learning platform, and professional development programmes. Since 2016, CoolThink@JC has trained more than 110 teachers from 32 pilot schools and benefited over 20,000 primary students with CoolThink classes. The CoolThink@JC approach prepares students for a fast-changing digital future through a hands-on, minds-on, and joyful learning experience. An independent evaluation has found that students participated in CoolThink@JC grew twice as much in problem-solving skills when compared with non-participating students. Following the successful implementation of the four-year pilot, the second phase of the CoolThink@JC is launched in 2020, with the aim of mainstreaming computational thinking education.

CTE2020 is held online on 19-21 August, 2020. Last year, the conference attracted over 600 worldwide scholars, educational practitioners and policymakers from 17 countries/ regions. The International Teacher Forum is first introduced this year to reach out to K-12 CT teachers. Under the pandemic, CTE2020 experienced reschedule and has switched from face-to-face to online mode. With the support from speakers, panelists, IPC Co-chairs, IPC members, LoC Co-Chairs, Coordinating Scholars, Review Panel Members and paper authors, we have gone through challenges and are excited to welcome participants to join us at the conference to share their research and ideas.

### Main Theme and Sub-themes

“**Computational Thinking Education**” is the main theme of CTE2020 which aims to keep abreast of the latest development of how to facilitate students’ CT abilities, and disseminate findings and outcomes on the implementation of CT development in school education. There are 16 sub-themes under CTE2020, namely:

Computational Thinking

Computational Thinking and Coding Education in K-12

Computational Thinking and Unplugged Activities in K-12

Computational Thinking and Subject Learning and Teaching in K-12

Computational Thinking and Teacher Development

Computational Thinking and IoT

Computational Thinking and STEM/STEAM Education

Computational Thinking and Data Science

Computational Thinking and Artificial Intelligence Education

Computational Thinking Development in Higher Education

Computational Thinking and Special Education Needs

Computational Thinking and Evaluation

Computational Thinking and Non-formal Learning

Computational Thinking and Psychological Studies

Computational Thinking in Educational Policy

General Submission to Computational Thinking Education

**Paper Submission to CTE2020**

The conference received a total of 46 submissions (32 full papers, 11 short papers and 3 poster papers) by 134 authors from 19 countries/regions (see Table 1).

*Table 1: Distribution of Paper Submissions for CTE2020*

Country / Region	No. of Authors	Country / Region	No. of Authors
<b>Australia</b>	2	<b>Israel</b>	2
<b>Brazil</b>	5	<b>Malaysia</b>	8
<b>Canada</b>	2	<b>Singapore</b>	12
<b>China</b>	18	<b>South Korea</b>	15
<b>Cyprus</b>	2	<b>Spain</b>	3
<b>Finland</b>	7	<b>Sweden</b>	2
<b>Germany</b>	8	<b>Taiwan</b>	21
<b>Greece</b>	1	<b>The Netherlands</b>	4
<b>Hong Kong</b>	4	<b>United States</b>	15
<b>India</b>	3	<b>Total</b>	<b>134</b>

The International Programme Committee (IPC) is formed by 98 Members and 13 Co-chairs worldwide. Each paper with author identification anonymous was reviewed by at least three IPC Members. Related sub-theme Chairs then conducted meta-reviews and made recommendation on the acceptance of papers based on IPC Members’ reviews. With the comprehensive review process, 37 accepted papers are presented (12 full papers, 17 short papers and 8 poster papers) (see Table 2) at the conference.

*Table 2: Paper Presented at CTE2020*

Sub-themes	Full Paper	Short Paper	Poster Paper	Total
<b>CT</b>	1	0	0	1
<b>CT and Coding Education in K-12</b>	3	2	2	7
<b>CT and Unplugged Activities in K-12</b>	1	1	0	2
<b>CT and Subject Learning and Teaching in K-12</b>	0	2	0	2
<b>CT and Teacher Development</b>	1	2	0	3
<b>CT and IoT</b>	0	1	0	1
<b>CT and STEM/STEAM Education</b>	1	2	1	4
<b>CT and Data Science</b>	0	0	0	0
<b>CT and Artificial Intelligence Education</b>	1	0	3	4
<b>CT Development in Higher Education</b>	3	2	0	5
<b>CT and Special Education Needs</b>	0	0	0	0
<b>CT and Evaluation</b>	0	2	0	2
<b>CT and Non-formal Learning</b>	0	0	1	1
<b>CT and Psychological Studies</b>	0	0	0	0
<b>CT in Educational Policy</b>	0	0	0	0
<b>General Submission to CT Education</b>	1	3	1	5
<b>Total</b>	<b>12</b>	<b>17</b>	<b>8</b>	<b>37</b>

**Paper Submission to CTE2020 International Teacher Forum**

The Forum received a total of 28 submissions by 56 authors from 8 countries/regions (see Table 1).

*Table 1: Distribution of Paper Submissions for CTE2020 International Teacher Forum*

Country / Region	No. of Authors	Country / Region	No. of Authors
<b>China</b>	1	<b>Singapore</b>	1
<b>Finland</b>	1	<b>South Korea</b>	12
<b>Hong Kong</b>	21	<b>Sweden</b>	2
<b>Lithuania</b>	3	<b>Taiwan</b>	15
		<b>Total</b>	<b>56</b>

The Review Panel for the Forum is formed by 32 Members and 8 Coordinating Scholars worldwide. Each paper with author identification anonymous was reviewed by at least two Review Panel Members. Coordinating Scholars of each participating country/region then conducted meta-reviews and made recommendation on the acceptance of papers based on Review Panel Members’ reviews. With the comprehensive review process, 24 accepted papers are presented (see Table 2) at the conference.

*Table 2: Paper Presented at CTE2020 International Teacher Forum*

Track	Number of Paper
<b>China (via Prof. Ronghuai HUANG)</b>	1
<b>Hong Kong (via Prof. Siu-cheung KONG)</b>	8
<b>Lithuania (via Prof. Valentina DAGIENE)</b>	3
<b>Singapore (via Prof. Chee-kit LOOI)</b>	1
<b>South Korea (via Dr. Hyo-Jeong SO)</b>	1
<b>Sweden (via Prof. Marcelo MILRAD)</b>	2
<b>Taiwan (via Prof. Ting-Chia HSU)</b>	6
<b>Taiwan (via Prof. Ju-ling SHIH)</b>	2
<b>Total</b>	<b>24</b>

## Conference Programme

The conference comprises keynote, invited speeches and forums by internationally renowned scholars, International Teacher Forum, workshop, doctoral consortium as well as academic paper and poster presentations.

### **(i) Keynote and Invited Speeches**

There are four Keynote Speeches and three Invited Speeches at CTE2020:

#### *Keynote Speeches*

1. “Computational Thinking Education Meets Artificial Intelligence”  
by Prof. ABELSON, Hal (Massachusetts Institute of Technology, The United States)
2. “Computational Thinking, Why is it Important and When to Learn What?”  
by Prof. SPECHT, Marcus (Technical University of Delft, The Netherlands)
3. “CT in the Disciplines: Realizing the Promise and Potential of Integrating Computational Thinking into School Learning”  
by Dr. GROVER, Shuchi (Looking Glass Ventures & Stanford University, The United States)
4. “Assessing Computational Thinking in PISA”  
by Dr. PIACENTINI, Mario (Programme for International Student Assessment (PISA), Organisation for Economic Cooperation and Development (OECD), France)

#### *Invited Speeches*

1. “The Five Issues to Facilitate Students Develop Innovative Algorithm for Solving Complex Authentic Problems”  
by Prof. HUANG, Ronghuai (Beijing Normal University, China)
2. “Fostering Digital Creativity in Primary School: Lessons Learned From a Large-scale Longitudinal Study of the *CoolThink@JC Pilot*”  
By Ms. SHEAR, Linda (SRI Education, SRI International, The United States)
3. “How Students Experience the Computational Thinking Process when Playing the Board Game - Robot City”  
by Prof. HSU, Ting-Chia (National Taiwan Normal University, Taiwan)



**(ii) International Forum on Professional Development of Teacher for Practicing Computational Thinking Education in K-12**

In this forum, there are presentations by speakers from different countries/regions on their sharing of research, practices and policies for facilitating professional development of K-12 CT teachers in their countries/regions. Discussions focus on the important issues for better preparing school teachers to effectively practice CTE in K-12.

Panelists:

Prof. LOOI, Chee-kit (Nanyang Technological University, Singapore)

Prof. MILRAD, Marcelo (Linnaeus University, Sweden)

Prof. SHIH, Ju-ling (National Central University, Taiwan)

Moderator:

Prof. KONG, Siu-cheung (The Education University of Hong Kong, Hong Kong)

**(iii) International Forum on Implementation of Computational Thinking Education in K-12**

In this forum, speakers from different countries/regions will share insights of the major practices, existing challenges and future plans for CTE implementation in K-12 schools in their own countries/regions. Discussions will focus on the critical issues for accommodating needs of K-12 schools for suitable curriculum integration to deliver CTE elements across different grades, professional development for teachers, and parent education.

Panelists:

Prof. HUANG, Ronghuai (Beijing Normal University, China)

Prof. IYER, Sridhar (Indian Institute of Technology Bombay, India)

Dr. SO, Hyo-Jeong (Ewha Womans University, South Korea)

Moderator:

Prof. KONG, Siu-cheung (The Education University of Hong Kong, Hong Kong)

**(iv) Workshop****Workshop “Learning Analytics for Supporting and Developing Computational Thinking Education”**

Renowned scholars in the field of CTE conduct a workshop on learning analytics, in which participants are introduced how it can be applied to support and develop computational thinking education.

Speakers:

Prof. KONG, Siu-cheung (The Education University of Hong Kong, Hong Kong)

Dr. LIU, Bowen (The Education University of Hong Kong, Hong Kong)

Prof. MILRAD, Marcelo (Linnaeus University, Sweden)

Prof. SPECHT, Marcus (Technical University of Delft, The Netherlands)

**(v) Doctoral Consortium**

An occasion where outstanding doctoral students can present and discuss their research projects and ideas with other scholars, and thereby facilitating fruitful exchange and communication.

Moderators:

Prof. SHIH, Ju-ling (National Central University, Taiwan)

**(vi) Academic Paper and Poster Presentations**

There are 12 sessions of academic paper presentation and 2 academic poster presentation sessions with 37 papers (12 full papers, 17 short papers and 8 poster papers) in the conference. Worldwide scholars present and exchange the latest research ideas and findings, which highlight the importance and pathways of computational thinking education covering K-12 education, artificial intelligence education, teacher development and STEM/STEAM education etc.

**(vii) International Teacher Forum**

There are 6 sessions of teacher paper presentation with 24 papers in the International Teacher Forum. K-12 CT teachers will share best practices and key challenges of implementing CTE in their countries/regions.

On behalf of CoolThink@JC and the Conference Organizing Committee, we would like to express our gratitude towards all speakers, panelists, as well as paper presenters for their contribution to the success of CTE2020.

We sincerely hope everyone enjoy and get inspired from CTE2020.

With Best Wishes,

Prof. KONG, Siu-cheung  
*The Education University of Hong Kong, Hong Kong*  
*Conference Chair of CTE2020*

Principal CHU, Tsz-wing  
*St. Hilary's Kindergarten and Primary Schools, Hong Kong*  
*Conference Chair of CTE2020*

## *ii. Conference Organisation*

### **CoolThink@JC Conference and Seminar Subcommittee**

#### **Leaders**

KONG, Siu-cheung	The Education University of Hong Kong, Hong Kong
CHU, Tsz-wing	St. Hilary's Kindergarten and Primary Schools, Hong Kong

#### **Members**

LAI, Daniel	The Hong Kong Jockey Club, Hong Kong
AU, Bruce	The Hong Kong Jockey Club, Hong Kong
LI, Robert Kwok-yiu	City University of Hong Kong, Hong Kong
DIAZ, Marisol	Massachusetts Institute of Technology, The United States
WONG, Kin-wai Albert	Association of I.T. Leaders in Education, Hong Kong
KONG, Fanny	The Education University of Hong Kong, Hong Kong

#### **International Advisory Committee**

ABELSON, Hal	Massachusetts Institute of Technology, The United States
CHAN, Tak-wai	National Central University, Taiwan
KAFAI, Yasmin B.	University of Pennsylvania, The United States
LOOI, Chee-kit	Nanyang Technological University, Singapore

#### **Conference Chairs**

KONG, Siu-cheung	The Education University of Hong Kong, Hong Kong
CHU, Tsz-wing	St. Hilary's Kindergarten and Primary Schools, Hong Kong

#### **International Program Committee Chair**

KONG, Siu-cheung	The Education University of Hong Kong, Hong Kong
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## International Program Committee Co-Chairs

Sub-theme: Computational Thinking

HOPPE, Heinz Ulrich                      University of Duisburg-Essen, Germany

Sub-theme: Computational Thinking and Coding Education in K-12

VAHRENHOLD, Jan                      University of Münster, Germany

Sub-theme: Computational Thinking and Unplugged Activities in K-12

SONG, Ki-sang                      Korea National University of Education, South Korea

Sub-theme: Computational Thinking and Subject Learning and Teaching in K-12

HUANG, Rong-huai                      Beijing Normal University, China

Sub-theme: Computational Thinking and Teacher Development

HSU, Ting-Chia                      National Taiwan Normal University, Taiwan

Sub-theme: Computational Thinking and IoT

SPECHT, Marcus                      Technical University of Delft, The Netherlands

Sub-theme: Computational Thinking and STEM/STEAM Education

MILRAD, Marcelo                      Linnaeus University, Sweden

Sub-theme: Computational Thinking and Artificial Intelligence Education

SULLIVAN, Florence                      UMass Amherst, The United States

Sub-theme: Computational Thinking Development in Higher Education

LI, Robert Kwok-yiu                      City University of Hong Kong, Hong Kong

Sub-theme: Computational Thinking and Special Education Needs

SIN, Kuen-fung                      The Education University of Hong Kong, Hong Kong

Sub-theme: Computational Thinking and Evaluation

KUO, Bor-chen                      National Taichung University of Education, Taiwan

Sub-theme: Computational Thinking and Non-formal Learning

LOOI, Chee-kit                      Nanyang Technological University, Singapore

Sub-theme: General Submission to Computational Thinking Education

SHIH, Ju-ling                      National Central University, Taiwan

**International Program Committee Members** (*Surnames in alphabetical order*)

ALEXANDRON, Giora	Weizmann Institute of Science, Israel
ARMONI, Michal	The Weizmann Institute of Science, Israel
BIST, Ankur Singh	KIET Ghaziabad, India
BOTIČKI, Ivica	University of Zagreb, Croatia
CABIBIHAN, John-John	Qatar University, Qatar
CAMP, Tracy	Colorado School of Mines, United States
CERRATTO-PARGMAN, Teresa	Stockholm University, Sweden
CHAN, Rosanna Yuen-yan	The Chinese University of Hong Kong, Hong Kong
CHANG, Li-chieh	National Central University, Taiwan
CHANG, Samuel Chi-cheng	National Taiwan Normal University, Taiwan
CHANG, Shao-Chen	National Taiwan Normal University, Taiwan
CHANG, Tingwen	Beijing Normal University, China
CHEN, Guang	Beijing Normal University, China
CHEN, Ming-puu	National Taiwan Normal University, Taiwan
CHENG, Shu-chen	Southern Taiwan University of Science and Technology, Taiwan
CHENG, Wei	Nanjing University of Posts and Telecommunications, China
CHEUNG, Ray Chak-chung	City University of Hong Kong, Hong Kong
CHIANG, Tosti Hsu-cheng	National Taiwan Normal University, Taiwan
CHIANG, Tsung-che	National Taiwan Normal University, Taiwan
CHOI, Hyungshin	Chuncheon National University of Education, Korea
DAVENPORT, James H.	University of Bath, United Kingdom
DHANDABANI, Lakshmi	Sri Vishnu Educational Society, India
DOUGLAS, Moody	City University of New York, United States
FANG, Hai-guang	Capital Normal University, China
GU, Xiaoqing	East China Normal University, China
HAN, SunGwan	Gyeongin National University of Education, Korea
HARRER, Andreas	Dortmund University of Applied Sciences and Arts, Germany
HAUCK, Jean	Federal University of Santa Catarina, Brazil

HEINTZ, Fredrik	Linköping University, Sweden
HERMANS, Felienne	Leiden University, Netherlands
HERSHKOVITZ, Arnon	Tel Aviv University, Israel
HO, Joshua	The University of Hong Kong, Hong Kong
HSIAO, Hsien-sheng	National Taiwan Normal University, Taiwan
HSU, Yu-Chang	Boise State University, United States
HUANG, Nen-fu	National Tsing Hua University, China
HUANG, Shu-hsien	National University of Tainan, Taiwan
HUNG, Hui-chun	Taipei Medical University, Taiwan
HWANG, Gwo-jen	National Taiwan University of Science and Technology, Taiwan
IYER, Sridhar	Indian Institute of Technology Bombay, India
JANSEN, Marc	University of Applied Sciences Ruhr West, Germany
JONG, Morris Siu-yung	The Chinese University of Hong Kong, Hong Kong
KEITH, Kevin	Landmark College, United States
KIM, Mi-song	University of Western Ontario, Canada
KING, Irwin Kuo-chin	The Chinese University of Hong Kong, Hong Kong
KOHEN-VACS, Dan	Holon Institute of Technology, Israel
KWOK, Lam-for	City University of Hong Kong, Hong Kong
KWOK, Linda Wai-ying	The Education University of Hong Kong, Hong Kong
LAI, Ming	The Education University of Hong Kong, Hong Kong
LARU, Jari	University of Oulu, Finland
LE, Nguyen-Thinh	Humboldt University of Berlin, Germany
LEE, Jeongmin	Ewha Womans University, Korea
LEONG, Hon-wai	National University of Singapore, Singapore
LEUNG, Howard	City University of Hong Kong, Hong Kong
LI, Xu	University of Arizona (UA South), United States
LI, Yue	South China University of Technology, China
LIN, Sung-chiang	National Taipei University of Education, Taiwan
LIN, Trinity Yu-tzu	National Taiwan Normal University, Taiwan

LU, Bin	California State University, United States
LUI, Ann Ming	Hong Kong Baptist University, Hong Kong
LUO, Tian	Old Dominion University, United States
MARCELINO, Maria	University of Coimbra, Portugal
MARTIN, Fred	University of Massachusetts Lowell, United States
MASON, Jon	Charles Darwin University, Australia
MISHRA, Shitanshu	Vanderbilt University, Tennessee
MOLLER, Faron	Swansea University, United Kingdom
OSMAN, Kamisah	National University of Malaysia, Malaysia
OTERO, Nuno	Linnaeus University, Sweden
ÖZÇINAR, Hüseyin	Pamukkale University, Turkey
PAL, Yogendra	Indian Institute of Technology Bombay, India
PATTON, Evan	Massachusetts Institute of Technology, United States
PESSOA, Teresa	University of Coimbra, Portugal
PINKWART, Niels	Humboldt University of Berlin, Germany
RAISINGHANI, Vijay	Narsee Monjee Institute of Management Studies, India
ROBLES, Gregorio	Rey Juan Carlos University, Spain
ROMÁN-GONZÁLEZ, Marcos	National Distance Education University, Spain
SEOW, Peter Sen-kee	National Institute of Education, Singapore
SHANG, Junjie	Peking University, China
SIT, Cindy Hui-ping	The Chinese University of Hong Kong, Hong Kong
SO, Hyo-Jeong	Ewha Womans University, Korea
SWANSON, Hillary	Northwestern University, United States
TAM, Vincent WL	The University of Hong Kong, Hong Kong
TANG, Jeff Kai-tai	The Open University of Hong Kong, Hong Kong
TSAI, Meng-Jung	National Taiwan Normal University, Taiwan
WADHWA, Bimlesh	National University of Singapore, Singapore
WANG, Qiyun	National Institute of Education, Singapore
WEINTROP, David	University of Maryland, United States
WIJEKUMAR, Kay	Texas A&M University, United States



WOOLLARD, John	University of Southampton, United Kingdom
WU, Longkai	National Institute of Education, Singapore
WU, Ying-tien	National Central University, Taiwan
YANG, Jie-chi	National Central University, Taiwan
YANG, Junfeng	Hangzhou Normal University, China
YU, Yuen-tak	City University of Hong Kong, Hong Kong
ZEIGLER, David	California State University, United States
ZHANG, Jinbao	Beijing Normal University, China
ZHANG, Yi	Central China Normal University, China
ZHENG, Lanqin	Beijing Normal University, China
ZHONG, Baichang	Nanjing Normal University, China

#### **International Teacher Forum Coordinating Scholars**

KONG, Siu-cheung	The Education University of Hong Kong, Hong Kong
DAGIENE, Valentina	Vilnius University, Lithuania
HSU, Ting-Chia	National Taiwan Normal University, Taiwan
HUANG, Ronghuai	Beijing Normal University, China
LOOI, Chee-Kit	Nanyang Technological University, Singapore
MILRAD, Marcelo	Linnaeus University, Sweden
SHIH, Ju-ling	National Central University, Taiwan
SO, Hyo-Jeong	Ewha Womans University, Korea

#### **International Teacher Forum Review Panel Members**

CERRATTO-PARGMAN, Teresa	Stockholm University, Sweden
CHA, Hyunjin	Soonchunhyang University, Korea
CHEN, Zhih-Hong	National Taiwan Normal University, Taiwan
CHOI, Hyungshin	Chuncheon National University of Education, Korea
FAN, Lei	Changchun Normal University, China
HSIEH, Yi-Zeng	National Taiwan Ocean University, Taiwan
HSU, Yu-Chang	Boise State University, the United States
HUANG, Shu-Hsien	National University of Tainan, Taiwan

HUNG, Hui-Chun	Taipei Medical University, Taiwan
HWANG, Jan-Pan	Chung Hua University, Taiwan
JIANG, Bo	Jiangnan University, China
KOHEN, Dan	Linnaeus University, Sweden
KOONG, Chorng-Shiuh	National Taichung University of Education, Taiwan
LAI, Ming	The Education University of Hong Kong, Hong Kong
LI, Cheng-Hsuan	National Taichung University of Education, Taiwan
LIN, Chang-Hsin	National University of Tainan, Taiwan
LIN, Yu-Tzu	National Taiwan Normal University, Taiwan
LIU, Chen-Chung	National Central University, Taiwan
SEOW, Peter	National Institute of Education, Singapore
SIU, Ka Yuk Cora	The Education University of Hong Kong, Hong Kong
TLILI, Ahmed	Beijing Normal University, China
WONG, Kin-wai Albert	Association of I.T. Leaders in Education, Hong Kong
WU, Long-Kai	National Institute of Education, Singapore
WU, Po-Han	National Taipei University of Education
WU, Sheng-Yi	National Pingtung University
XIAO, Guangde	Beijing Normal University, China
YANG, Junfeng	Hangzhou Normal University, China
YANG, Kai-Hsiang	National Taipei University of Education
YEH, Martin K.-C	Penn State University, the United States
YEN, Jung-Chuan	National Taipei University of Education
ZHANG, Dingwen	Beijing Normal University, China
ZHUANG, Rongxia	Beijing Normal University, China

#### **Local Organizing Committee Chair**

CHU, Tsz-wing	St. Hilary's Kindergarten and Primary Schools, Hong Kong
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**Local Organizing Committee Co-chairs** (*Surnames in alphabetical order*)

DIAZ, Marisol	Massachusetts Institute of Technology, The United States
KAM, Wai-ming Stanley	The Hong Kong Association for Computer Education, Hong Kong
KOWK, Chi-wai Ron	City University of Hong Kong, Hong Kong
WONG, Kin-wai Albert	Association of I.T. Leaders in Education, Hong Kong

**Editorial Team**

KONG, Fanny	The Education University of Hong Kong, Hong Kong
CHEUNG, Hilda	The Education University of Hong Kong, Hong Kong
CHAN, Vera	The Education University of Hong Kong, Hong Kong
LAU, Vicky	The Education University of Hong Kong, Hong Kong
LAW, Jessica	The Education University of Hong Kong, Hong Kong
LAW, Maggie	The Education University of Hong Kong, Hong Kong

### iii. Programme Overview

Remarks: All the time shown on the schedule are Hong Kong Time.

Time	Day 1: 19 August (Wednesday)	Day 2: 20 August (Thursday)			Day 3: 21 August (Friday)			
09:00 – 09:15	Registration							
09:15 – 09:30								
09:30 – 09:50	Opening	Keynote Speech (3) Dr. GROVER, Shuchi			Invited Speech (2) Ms. SHEAR, Linda			
09:50 – 10:00	Keynote Speech (1) Prof. ABELSON, Hal							
10:00 – 10:10								
10:10 – 10:20								
10:20 – 10:30								
10:30 – 10:40		Break			Break			
10:40 – 10:50	Academic Paper Presentation Sessions 1-3 (English)	Academic Poster Presentation Sessions 1 (Chinese)	Academic Poster Presentation Sessions 2 (English)	Doctoral Consortium	Teacher Forum Session 1 (English)	Teacher Forum Session 2 (Chinese)	Teacher Forum Session 3 (Chinese)	
10:50 – 11:00								
11:00 – 11:10								
11:10 – 11:20								
11:20 – 11:30								
11:30 – 11:40	Lunch	International Forum on Implementation of Computational Thinking Education in K-12				Teacher Forum Session 4 (English)	Teacher Forum Session 5 (Cantonese)	
11:40 – 11:50		Lunch						
11:50 – 12:00								
12:00 – 12:10		Lunch						
12:10 – 12:20								
12:20 – 12:30	Academic Paper Presentation Sessions 4-6 (Chinese)	Lunch			Lunch			
12:30 – 12:40								
12:40 – 12:50		Lunch			Lunch			
12:50 – 13:00								
13:00 – 13:10		Academic Paper Presentation Sessions 10-12 (English)			Invited Speech (3) Prof. HSU, Ting-Chia			
13:10 – 13:20								
13:20 – 13:30	Academic Paper Presentation Sessions 7-9 (English)	Lunch			Workshop on Learning Analytics for Supporting and Developing Computational Thinking Education			Teacher Forum Session 6 (English)
13:30 – 13:40								
13:40 – 13:50		Invited Speech (1) Prof. HUANG, Ronghuai			Closing			
13:50 – 14:00								
14:00 – 14:10		Keynote Speech (2) Prof. SPECHT, Marcus	Keynote Speech (4) Dr. PIACENTINI, Mario			Closing		
14:10 – 14:20								
14:20 – 14:30	International Forum on Professional Development of Teacher for Practicing Computational Thinking Education in K-12			Closing				
14:30 – 14:40								
14:40 – 14:50	Closing							
14:50 – 15:00								
15:00 – 15:10	Closing							
15:10 – 15:20								
15:20 – 15:30	Closing							
15:30 – 15:40								
15:40 – 15:50	Closing							
15:50 – 16:00								
16:00 – 16:10	Closing							
16:10 – 16:20								
16:20 – 16:30	Closing							
16:30 – 16:40								
16:40 – 16:50	Closing							
16:50 – 17:00								

## iv. Programme Schedule

*Remarks: All the time shown on the schedule are Hong Kong Time.*

Day 1: 19 August, 2020 (Wednesday)		Venue
09:00   09:30	<b>Registration</b>	Room 1
09:30   09:50	<b>Opening of CTE2020</b>	Room 1
09:50   10:50	<b>Keynote Speech (1)</b> <i>Computational Thinking Education Meets Artificial Intelligence</i> Speaker: Prof. ABELSON, Hal (Massachusetts Institute of Technology, US) Moderator: Prof. KONG, Siu-cheung (The Education University of Hong Kong, HK)	Room 1
10:50   11:50	<b>Academic Paper Presentation Session 1 (English)</b> Session Chair: Ms. LAO, Natalie (Massachusetts Institute of Technology, US)  <u>Track 9: Computational Thinking and Artificial Intelligence Education</u> <i>Experiences from Teaching Actionable Machine Learning at the University Level through a Small Practicum Approach (paper 9)</i> LAO, Natalie; LEE, Irene; ABELSON, Hal  <u>Track 2: Computational Thinking and Coding Education in K-12</u> <i>Computational Thinkers: Contemporary Approaches and Directions in Computational Thinking for K-12 Education (paper 23)</i> FLOYD, Steven	Room 1
10:50   11:50	<b>Academic Paper Presentation Session 2 (English)</b> Session Chair: Dr. WU, Sally P. W. (Northwestern University, US)  <u>Track 2: Computational Thinking and Coding Education in K-12</u> <i>An Item Response Theory Analysis of the Sequencing of Algorithms &amp; Programming Concepts (paper 7)</i> ALVES, Nathalia Da Cruz; GRESSE VON WANGENHEIM, Christiane; HAUCK, Jean Carlo Rossa; BORGATTO, Adriano Ferreti; ANDRADE, Dalton Francisco De  <u>Track 5: Computational Thinking and Teacher Development</u> <i>Workshops and Co-design Can Help Teachers Integrate Computational Thinking into Their K-12 STEM Classes (paper 27)</i> WU, Sally P. W.; PEEL, Amanda; BAIN, Connor; ANTON, Gabriella; HORN, Michael; WILENSKY, Uri	Room 2
10:50   11:50	<b>Academic Paper Presentation Session 3 (English)</b> Session Chair: Dr. LI, Xu (University of Arizona, US)  <u>Track 10: Computational Thinking Development in Higher Education</u> <i>Teaching Computational Thinking to Applied Science Majors: What and How (paper 32)</i> LI, Xu	Room 3

Day 1: 19 August, 2020 (Wednesday)		Venue
	<p><u>Track 7: Computational Thinking and STEM/STEAM Education</u>  <i>Confronting Frame Alignment in CT Infused STEM Classrooms (paper 36)</i>            BAIN, Connor; DABHOLKAR, Sugat; WILENSKY, Uri</p>	
11:50   12:50	<b>Lunch</b>	N/A
12:50   14:00	<p><b>Academic Paper Presentation Session 4 (Chinese)</b></p> <p><u>Track 6: Computational Thinking and IoT</u>  <i>CT-6E Model for Developing the IoT Teaching Activity</i>            運用 CT-6E 模式發展高中生之物聯網教學活動規劃 (paper 48)            HSIAO, Hsien-Sheng; CHANG, Chung-Pu</p> <p><u>Track 3: Computational Thinking and Unplugged Activities in K-12</u>  <i>Comparison of the Learning Behaviors of the Third Grader Students Integrating Robots and the Computational Thinking Board Game in Singapore and Taiwan</i>            比較新加坡和台灣小學三年級學生整合機器人與運算思維桌遊之學習行為 (paper 44)            LIANG, Yi-Sian; HSU, Ting-Chia</p> <p><u>Track 10: Computational Thinking Development in Higher Education</u>  <i>Development of Programming Self-efficacy Scale for University Students in the Information Domain</i>            資訊領域大學學生程式設計思考程序自我效能量表發展之研究 (paper 51)            HSIAO, Hsien-Sheng; LAI, Jun-Wei; WU, I-Ning; CHANG, Chung-Pu</p>	Room 1
12:50   14:00	<p><b>Academic Paper Presentation Session 5 (Chinese)</b>            Session Chair: Miss GAO, Hanrui (Central China Normal University, China)</p> <p><u>Track 12: Computational Thinking and Evaluation</u>  <i>Learning Behaviors Analysis of the Six Grader Students Integrating Educational Robots with the Computational Thinking Board Game</i>            小學六年級學生使用教育機器人結合運算思維桌上遊戲之學習行為分析 (paper 42)            ZHOU, Tzu-Chin; HSU, Ting-Chia</p> <p><u>Track 16: General Submission to Computational Thinking Education</u>  <i>Analysis of Research Status and Trends of Computational Thinking in China Based on Knowledge Graph</i>            基于知识图谱的我国计算思维研究现状与研究趋势探析 (paper 17)            GAO, Hanrui; ZHANG, Yi; MO, Wei; LI, Xing</p> <p><u>Track 4: Computational Thinking and Subject Learning and Teaching in K-12</u>  <i>An Empirical Study of Analyzing the Behaviors of the Sixth Grade Students in Learning English Oral Interaction with Educational Robots</i>            探討六年級學生使用教育機器人學習英語口語互動之行為實證分析 (paper 43)            HSU, Chao-ju; HSU, Ting-Chia</p>	Room 2

Day 1: 19 August, 2020 (Wednesday)		Venue
	<p><b>Academic Paper Presentation Session 6 (Chinese)</b> Session Chair: Mr. ZHOU, Pinghong (Central China Normal University, China)</p> <p><u>Track 7: Computational Thinking and STEM/STEAM</u> <i>A Study on Influential Factors of Primary School Students' Computational Thinking in Interdisciplinary STEM Teaching</i> 跨学科STEM教学中小学生计算思维影响因素研究 (paper 26) ZHOU, Pinghong; ZHANG, Yi; MO, Wei; WANG, Jue</p>	
12:50   14:00	<p><u>Track 2: Computational Thinking and Coding Education in K-12</u> <i>Effects of Using Mobile Phone Programs to Control Educational Robots on the Programming Self-Efficacy of the Third Grade Students</i> 三年級學生使用手機程式控制教育機器人對其程式自我效能表現之研究 (paper 45) LIN, Yi-ting; HSU, Ting-Chia</p> <p><u>Track 16: General Submission to Computational Thinking Education</u> <i>The Impact of Using Mobile Block-based Programming to Control Robots on the Performance of the Fifth Grader Students Learning Computational Thinking in Singapore</i> 使用手機積木程式工具操控機器人對新加坡五年級學生運算思維表現之影響 (paper 46) JEN, Tien-Hsiu; HSU, Ting-Chia</p>	Room 3
14:00   15:00	<p><b>Academic Paper Presentation Session 7 (English)</b> Session Chair: Dr. SEOW, Peter Sen-Kee (National Institute of Education, Singapore)</p> <p><u>Track 2: Computational Thinking and Coding Education in K-12</u> <i>Towards Using Computational Modeling in Learning of Physical Computing – An Observational Study in Singapore Schools (paper 52)</i> SEOW, Peter Sen-Kee; WADHWA, Bimlesh; LIM, Zhao-Xiong; LOOI, Chee Kit</p> <p><i>Computational Thinking and Creativity: A Test for Interdependency (paper 14)</i> ISRAEL-FISHELSON, Rotem; HERSHKOVITZ, Arnon; EGUÍLUZ, Andoni; GARAIJAR, Pablo; GUENAGA, Mariluz</p>	Room 1
14:00   15:00	<p><b>Academic Paper Presentation Session 8 (English)</b> Session Chair: Mr. LAI, Gabriel Chun-Hei (City University of Hong Kong, HK)</p> <p><u>Track 10: Computational Thinking Development in Higher Education</u> <i>Teaching Computational Thinking and Python Programming for Business Students: A Preliminary Study of the Alignment of Teaching and Learning Strategies with Bloom's Taxonomy of Learning Outcomes (paper 30)</i> LAI, Gabriel Chun-Hei; KWOK, Ron Chi-Wai; KONG, Joseph Siu-Lung</p> <p><u>Track 16: General Submission to Computational Thinking Education</u> <i>Investigating the Effects of Gender and Scaffolding tools on the Development of Preschooler's Computational Thinking (paper 20)</i> GEORGIU, Kyriakoula; ANGELI, Charoula</p>	Room 2

Day 1: 19 August, 2020 (Wednesday)		Venue
<p><b>Academic Paper Presentation Session 9 (English)</b> Session Chair: Prof. MILRAD, Marcelo (Linnaeus University, Sweden)</p> <p><u>Track 7: Computational Thinking and STEM/STEAM</u> 14:00   <i>CT-based Collaborative Storytelling for Learning Programming Concepts in Python (paper 55)</i> 15:00 PHUAN, Nicol Hui Yi ; LEE, Chien-Sing ; OOI, Ean-Huat</p> <p><u>Track 4: Computational Thinking and Subject Learning and Teaching in K-12</u> <i>On the Integration of Learning Mathematics and Programming (paper 21)</i> KOHEN-VACS, Dan; KYNIGOS, Chronis; MILRAD, Marcelo</p>	Room 3	
<p>15:00   <b>Keynote Speech (2)</b> <i>Computational Thinking, Why is it Important and When to Learn What?</i> 16:00 Speaker: Prof. SPECHT, Marcus (Technical University of Delft, The Netherlands) Moderator: Prof. CHAN, Tak Wai (National Central University, Taiwan)</p>	Room 1	
<p><b>International Forum on Professional Development of Teacher for Practicing Computational Thinking Education in K-12</b></p> <p>16:00   Panelists: Prof. LOOI, Chee-kit (Nanyang Technological University, Singapore) 17:00 Prof. MILRAD, Marcelo (Linnaeus University, Sweden) Prof. SHIH, Ju-ling (National Central University, Taiwan)</p> <p>Moderator: Prof. KONG, Siu-cheung (The Education University of Hong Kong, Hong Kong)</p>	Room 1	

Day 2: 20 August, 2020 (Thursday)		Venue
<p>09:00   <b>Registration</b> 09:30</p>	Room 1	
<p>09:30   <b>Keynote Speech (3)</b> <i>CT in the Disciplines: Realizing the Promise and Potential of Integrating Computational Thinking into School Learning</i> 10:30 Speaker: Dr. GROVER, Shuchi (Looking Glass Ventures &amp; Stanford University, US) Moderator: Prof. LOOI, Chee-kit (Nanyang Technological University, Singapore)</p>	Room 1	
<p>10:30   <b>Break</b> 10:40</p>	N/A	
<p>10:40   <b>Academic Poster Presentation Session 1 (Chinese)</b> Session Chair: Mr. GONG, Zhihui (Peking University, China) 11:10</p>	Room 1	



Day 2: 20 August, 2020 (Thursday)	Venue
<p><u>Track 16: General Submission to Computational Thinking Education</u>  <i>Computational Thinking Implemented in Five Sets of High School Information Technology Textbooks in Mainland China: Comparative Study of Methods and Strategies</i>            計算思維在中國大陸五套高中信息技术教材中落实的方法与策略的比较研究 (paper 24)            GENG, Ya- Jing; LI, Feng</p> <p><u>Track 9: Computational Thinking and Artificial Intelligence Education</u>  <i>Analysis of the Current Situation and Hotspots of Artificial Intelligence Education in China — Visual Analysis based on Chinese Literature from 2015 to 2019</i>            中国大陆人工智能教育研究现状及热点分析 — 基于2015 - 2019年中文文献的可视化分析 (paper 49)            GONG, Zhihui; HU, Qiuping; SHANG, Junjie</p>	
<p><b>Academic Poster Presentation Session 2 (English)</b>            Session Chair: Dr. WONG, Kwong-Cheong (The Hong Kong Polytechnic University, HK)</p> <p><u>Track 2: Computational Thinking and Coding Education in K-12</u>  <i>Canada's CanCode Initiative and the Gender Gap in Computer Science Education</i>            (paper 22)            FLOYD, Lisa Anne</p> <p><u>Track 9: Computational Thinking and Artificial Intelligence Education</u>  <i>Using Transfer Learning, Spectrogram Audio Classification, and MIT App Inventor to Facilitate Machine Learning Understanding</i> (paper 38)            BHATIA, Nikhil; LAO, Natalie</p> <p><u>Track 2: Computational Thinking and Coding Education in K-12</u>  <i>Exploring Creativity, Emotion and Collaborative Behavior in Programming for Two Contrasting Groups</i> (paper 15)            SUN, Dan; OUYANG, Fan; LI, Yan; CHEN, Hongyu</p> <p><u>Track 7: Computational Thinking and STEM/STEAM</u>  <i>An Exploration of Students' Computational Thinking Performance in a Scenario-based Robotic Learning Game &lt;Callisto Summit&gt;</i> (paper 47)            LIN, Kung-Hou; SHIH, Ju-Ling; CHUANG, Tsung-Yen</p> <p><u>Track 9: Computational Thinking and Artificial Intelligence Education</u>  <i>Computational Thinking and Artificial Intelligence Education: A Balanced Approach Using both Classical AI and Modern AI</i> (paper 53)            WONG, Kwong-Cheong</p> <p><u>Track 13: Computational Thinking and Non-formal Learning</u>  <i>Implementing a Computational Thinking Curriculum with Robotic Coding Activities through Non-formal Learning</i> (paper 19)            LEE, Poh-Tin; LEE, Xin-Rui; KOKILA, Athinamilagi</p>	<p>Room 2</p>

Day 2: 20 August, 2020 (Thursday)		Venue
10:40   13:40	<b>Doctoral Consortium</b> Moderator: Prof. SHIH, Ju-ling (National Central University, Taiwan)	Room 3
11:40   12:40	<b>International Forum on Implementation of Computational Thinking Education in K-12</b>  Panelists: Prof. HUANG, Ronghuai (Beijing Normal University, China) Prof. IYER, Sridhar (Indian Institute of Technology Bombay, India) Dr. SO, Hyo-Jeong (Ewha Womans University, South Korea)  Moderator: Prof. KONG, Siu-cheung (The Education University of Hong Kong, Hong Kong)	Room 1
12:40   13:40	<b>Lunch</b>	N/A
13:40   14:50	<b>Academic Paper Presentation Session 10 (English)</b> Session Chair: Mr. DENGEL, Andreas (University of Würzburg, Germany)  <u>Track 10: Computational Thinking Development in Higher Education</u> <i>Developing Computational Thinking Through Tinkering in Engineering Design (paper 54)</i> RAINA, Ashutosh; IYER, Sridhar; MURTHY, Sahana  <u>Track 3: Computational Thinking and Unplugged Activities in K-12</u> <i>Public-Private-Key Encryption in Virtual Reality: Predictors of Students' Learning Outcomes for Teaching the Idea of Asymmetric Encryption (paper 29)</i> DENGEL, Andreas	Room 1
13:40   14:50	<b>Academic Paper Presentation Session 11 (English)</b> Session Chair: Dr. LEE, Chien-Sing (Sunway University, Malaysia) <u>Track 1: Computational Thinking</u> <i>Computational Thinking Competences in Countries from Three Different Continents in the Mirror of Students' Characteristics and School Learning (paper 33)</i> LABUSCH, Amelie; EICKELMANN, Birgit  <u>Track 10: Computational Thinking Development in Higher Education</u> <i>A Comparison of Computational Thinking Approaches in HCI-SEO Design: Implications to Teaching and Learning STE(A)M (paper 56)</i> LEE, Chien-Sing  <u>Track 5: Computational Thinking and Teacher Development</u> <i>The Effect of Teacher Interventions and SRA Robot Programming on the Development of Computational Thinking (paper 13)</i> FANCHAMPS, Nardie; SPECHT, Marcus; HENNISSSEN, Paul; SLANGEN, Lou	Room 2

Day 2: 20 August, 2020 (Thursday)		Venue
<p><b>13:40</b>   <b>14:50</b></p>	<p><b>Academic Paper Presentation Session 12 (English)</b> Session Chair: Prof. LOOI, Chee-kit (Nanyang Technological University, Singapore)</p> <p><u>Track 5: Computational Thinking and Teacher Development</u> <i>Preservice Teachers' Views of Computational Thinking: STEM Teachers vs non-STEM Teachers (paper 39)</i> LOOI, Chee Kit; CHAN, Shiau Wei; HUANG, Wendy; SEOW, Peter; WU, Longkai</p> <p><u>Track 12: Computational Thinking and Evaluation</u> <i>Using Eye-Tracking to Evaluate Program Comprehension (paper 35)</i> DEITELHOFF, Fabian; HARRER, Andreas; SCHRÖDER, Benedikt; HOPPE, H. Ulrich; KIENLE, Andrea</p> <p><u>Track 16: General Submission to Computational Thinking Education</u> <i>Integrating Computational Thinking in K-12 Education: Exploring Digital Fabrication Activities through CTPACK Framework (paper 37)</i> IWATA, Megumi; LARU, Jari; MÄKITALO, Kati; PITKÄNEN, Kati</p>	Room 3
<p><b>14:50</b>   <b>15:50</b></p>	<p><b>Invited Speech (1)</b> <i>The Five Issues to Facilitate Students Develop Innovative Algorithm for Solving Complex Authentic Problems</i> Speaker: Prof. HUANG, Ronghuai (Beijing Normal University, China) Moderator: Prof. SHIH, Ju-ling (National Central University, Taiwan)</p>	Room 1
<p><b>15:50</b>   <b>16:50</b></p>	<p><b>Keynote Speech (4)</b> <i>Assessing Computational Thinking in PISA</i> Speaker: Dr. PIACENTINI, Mario (PISA, Organisation for Economic Co-operation and Development, France) Moderator: Prof. KONG, Siu-cheung (The Education University of Hong Kong, HK)</p>	Room 1

Day 3: 21 August, 2020 (Friday)		Venue
<p><b>09:00</b>   <b>09:30</b></p>	<p><b>Registration</b></p>	Room 1
<p><b>09:30</b>   <b>10:30</b></p>	<p><b>Invited Speech (2)</b> <i>Fostering Digital Creativity in Primary School: Lessons Learned From a Large-scale Longitudinal Study of the CoolThink@JC Pilot</i> Speaker: Ms. SHEAR, Linda (SRI Education, SRI International, US) Moderator: Mr. LAI, Daniel (The Hong Kong Jockey Club, HK)</p>	Room 1
<p><b>10:30</b>   <b>10:40</b></p>	<p><b>Break</b></p>	N/A

Day 3: 21 August, 2020 (Friday)		Venue
<p><b>Teacher Forum Session 1 (English)</b>  <i>Approaches of Integrating Computational Thinking into Programming Lessons (paper 7)</i>                      HO, Wei Sin</p> <p><i>Teaching MIT App Inventor Programming for Computational Thinking Development in Grade 6 with 'To play, to think, to code' Approach: A Two-button Game (Paper 29)</i>                      LUK, Wai-kei</p> <p><b>10:40</b>                         <b>12:00</b>  <i>Using Iteration Concept in Teaching MIT App Inventor Programming in Primary 5-6 students for Computational Thinking Development (Paper 31)</i>                      LUK, Kin Chung William</p> <p><i>Pedagogical Practices in Teaching Scratch &amp; Micro: bit Programming for Computational Thinking Development: Developing Diet Related Games (Paper 32)</i>                      CHENG, Yuen Ting</p> <p><i>Fostering 21st Century Literacy and Computational Thinking Through Robotic STEM Design Competition Game (Paper 23)</i>                      HUANG, Hsin-Yin; SHIH, Ju-Ling</p>	Room 1	
<p><b>Teacher Forum Session 2 (Chinese)</b></p> <p><i>Computing Thinking and Artificial Intelligence Curriculum design: AI Power Recycling Box</i>                      運算思維暨人工智慧教學活動設計：AI 電力回收盒 (Paper 5)                      HSU, Tai-Ping; HSU, Ting-Chia; HUANG, I-Chen</p> <p><i>Inquiry-based Learning by Role-Playing in Computational Thinking</i>                      探究式角色扮演之運算思維 (Paper 11)                      CHUANG, Chien-Wen; CHEN, Chia-Liang</p> <p><b>10:40</b>                         <b>11:40</b>  <i>Cross-learning Stage Technology Implementation Activities Probe-obstacle Avoidance Car</i>                      跨學習階段科技實作活動初探-以避障車為例 (Paper 12)                      SU, Shih Wen; TSAI, I Fan</p> <p><i>Artificial Intelligence and Internet of Things Teaching Activity Design: AIoT Resource Recovery</i>                      人工智慧及物聯網教學活動設計：AIoT 資源回收 (Paper 13)                      TSENG, His-Che</p>	Room 2	
<p><b>Teacher Forum Session 3 (Chinese)</b>  <i>Research on Personalized Teaching Strategy Driven by Artificial Intelligence in K12 Stage</i>                      K12 階段人工智能驱动个性化教学策略研究 (Paper 6)                      LIU, Qiang</p> <p><b>10:40</b>                         <b>11:40</b>  <i>Put an Unplugged Pedagogy Using an Educational Board Game of Computational Thinking into Practice —Taking the Board Game named Robot City V2 into an Example</i>                      使用運算思維教育桌遊實踐不插電教學—以「新機器人蓋城市」桌遊為例 (Paper 16)                      YANG, Shih Hung; HSU, Ting Chia</p>	Room 3	

Day 3: 21 August, 2020 (Friday)		Venue
	<p><i>The Effectiveness of Interdisciplinary Computational Thinking Education for Middle School Students: A Case of Integrating IT in Technology Domain and Mathematics Domain</i>            中學生跨域運算思維學習成效研究：以導入科技領域資訊科技與數學領域為例 (Paper 19)            CHEN, Chuen-Cheng</p> <p><i>Using Computational Thinking Skills to Learning on Musicals Animation Design</i>            國小學生應用運算思維歷程設計音樂劇動畫之研究 (Paper 22)            FENG, Chia-Yen; WANT, Yu; CHEN, Ying-Rong</p>	
11:40   12:55	<p><b>Teacher Forum Session 4 (English)</b></p> <p><i>A Pedagogical Practice in Teaching MIT App Inventor Programming in Grade 5 for Computational Thinking Development: Developing a Winning Number Guessing App</i> (Paper 17)            LI, Wing-kai; LAM, Man-hay; YEUNG, Shing-chun</p> <p><i>Ewha Hackathon Program for Improving Elementary Students' Computational Thinking Based on Design Thinking Process</i> (Paper 24)            PARK, Ju Yeon; CHUNG, Hye Young; KIM, Sung Hee; CHO, Su Bin; LEE, Young Mi; LEE, Yoo Kyung; YOON, Hye Sun; PYO, Jee Eun; LEE, Jae Ho; LEE, Won Kyung; LEE, Jung Ah; KIM, Eun Bi</p> <p><i>A Pedagogical Practice in Teaching MIT App Inventor Programming in Grade 6 for Computational Thinking Development: Developing a Factor App</i> (Paper 27)            MOK, Hon Wai</p> <p><i>Experience and Reflections in Teaching Computational Thinking at School</i> (Paper 30)            CHONG, Chi-kwan; LO, Chi-kei</p> <p><i>Computational Thinking Unplugged in CS Middle Class Lessons in Lithuania</i> (Paper 10)            JASUTĖ, Eglė</p>	Room 2
11:40   12:40	<p><b>Teacher Forum Session 5 (Cantonese)</b></p> <p><i>4D Immersive Experience Space: Spatial Impacts on Students' Coding Skill</i>            4D 沉浸體驗空間：多維空間元素對運算思維教學的影響 (Paper 26)            CHING, Chi Cheung; HUI, Siu Lung; TSANG, Ka Kui; CHANG, Kei Yu</p> <p><i>Using Five Steps of Design Thinking to Create "ECO-TAXI"</i>            運算思維教育的教學反思：運用設計思維五部曲創作程式「ECO-TAXI」 (Paper 28)            WONG, Mau Fai; WONG, Yuk Yue Vicky</p>	Room 3
12:40   13:40	<b>Lunch</b>	N/A
13:40   14:40	<p><b>Invited Speech (3)</b></p> <p><i>How Students Experience the Computational Thinking Process when Playing the Board Game-Robot City</i>            Speaker: Prof. HSU, Ting-Chia (National Taiwan Normal University, Taiwan)            Moderator: Prof. LI, Robert Kwok-yiu (City University of Hong Kong, HK)</p>	Room 1

Day 3: 21 August, 2020 (Friday)		Venue
14:40   15:40	<b>Workshop on Learning Analytics for Supporting and Developing Computational Thinking Education</b>	Room 2
14:40   15:40	<p><b>Teacher Forum Session 6 (English)</b>  <i>Unplugged'' Programming - A Way to Learn the Basics of Programming (Paper 15)</i>            SVENSSON, Berit</p> <p><i>Computer Science Teaching in Vilnius Lyceum, Lithuania (Paper 8)</i>            SKUPAS, Bronius</p> <p><i>Educational Benefits of an Integrative Approach Combining STEM, Project Based Learning, Robotics and Programming in Schools (Paper 25)</i>            EKLUND, Emma</p> <p><i>Teaching Computational Thinking in Lithuania's Primary Schools (Paper 9)</i>            FILONČIKIENĖ, Rūta</p>	Room 3
15:40   16:40	<b>Closing</b>	Room 1

## v. Keynote and Invited Speeches

### Keynote Speech (1)

#### Computational Thinking Education Meets Artificial Intelligence

**Date** : 19 August, 2020 (Wednesday)

**Time** : 09:50 – 10:50 (HKT)

**Venue** : Room 1



**Speaker: Prof. ABELSON, Hal**

**(Massachusetts Institute of Technology, The  
United States)**



**Moderator: Prof. KONG, Siu-cheung  
(The Education University of Hong Kong, Hong Kong)**

#### *Speech Abstract*

Over the past decade innovations such as social networks, online news and Internet commerce have made information technology omnipresent in daily life for much of the world's population. This has driven the call for K-12 school education to include computational thinking as an essential topic in preparing students for a world increasingly shaped by information technology. Yet even as educators are assimilating the calls to include computing in K-12, the environment for educational computing is being upended by the global explosion of interest in artificial intelligence. While AI builds on CT foundations, its influence on CT education is transformative. Abstraction and modularity remain key, but algorithmic concepts like sequencing and conditionals become less critical in light on increased emphasis on statistical methods. More fundamentally, progress in AI demands that CTE pay attention to the societal impact of computing. AI practitioners in industry and academia are starting to come to grips with their responsibility for the consequences of their work. Many technology companies have adopted policies around “responsible AI” and university courses in AI increasingly include units on ethical design. That same concern is moving into CTE, and K-12 education is beginning to draw on ideas from ethics and sociology alongside traditional technical disciplines.

#### *Speaker Bio*

Prof. Abelson is Class of 1922 Professor of Electrical Engineering and Computer Science at MIT and a Fellow of the IEEE. He holds an A.B. degree from Princeton University and a Ph.D. degree in mathematics from MIT. In 1992, he was designated as one of MIT's six inaugural MacVicar Faculty Fellows, in recognition of his significant and sustained contributions to teaching and undergraduate education. He won numerous education awards conferred by MIT, IEEE, ACM, etc.

Also, he has played key roles in fostering MIT institutional educational technology initiatives including MIT Open CourseWare and DSpace, and has served as co-chair of the MIT Council on Educational Technology, which oversees MIT's strategic educational technology activities and investments. He is a leader in the worldwide movement towards openness and democratization of culture and intellectual resources. He is a founding director of Creative Commons, Public Knowledge, and the Free Software Foundation, and a former director of the Center for Democracy and Technology – organizations that are devoted to strengthening the global intellectual commons.



## Keynote Speech (2)

### Computational Thinking, Why is it Important and When to Learn What?

**Date** : 19 August, 2020 (Wednesday)

**Time** : 15:00 – 16:00 (HKT)

**Venue** : Room 1



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**Speaker: Prof. SPECHT, Marcus**

**(Technical University of Delft, The Netherlands)**

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**Moderator: Prof. CHAN, Tak Wai**  
**(National Central University, Taiwan)**

#### *Speech Abstract*

The talk will discuss some background on programming education and the embedding of programming education mainly in secondary and higher education. The talk will give some examples of learning programming in higher education and what the relation to underlying concepts and the different facets of computational concepts to the actual use in the BSc and MSc studies are. The embedding of CT concepts in higher education in that sense is related to questions of student motivation, task and assignment design, as also changes towards a digital curriculum. The talk should conclude with reflection on some lessons learned on important components for building sustainable student motivation for using computational means in their study and later job.

#### *Speaker Bio*

Prof. Dr. Marcus Specht is Professor for Digital Education at the Technical University of Delft and Director of the Leiden-Delft-Erasmus Center for Education and Learning. He received his Diploma in Psychology in 1995 and a Dissertation from the University of Trier in 1998 on adaptive information technology. From 2001 he headed the department "Mobile Knowledge" at the Fraunhofer Institute for Applied Information Technology (FIT). From 2005 to 2018 he was Professor for Learning Technologies at the Open Universiteit Nederland and head of the Learning Innovation Lab. His research focus is on Computational Thinking, Learning Analytics, AI in Education, and Virtual and Augmented Reality for Education. Prof. Specht is an Apple Distinguished Educator and was President (2013-2015) of the International Association of Mobile Learning.

### **Keynote Speech (3)**

#### **CT in the Disciplines: Realizing the Promise and Potential of Integrating Computational Thinking into School Learning**

**Date** : 20 August, 2020 (Thursday)  
**Time** : 09:30 – 10:30 (HKT)  
**Venue** : Room 1



**Speaker: Dr. GROVER, Shuchi**

**(Looking Glass Ventures & Stanford University, The United States)**



**Moderator: Prof. LOOI, Chee-kit**  
**(Nanyang Technological University, Singapore)**

#### ***Speech Abstract***

It is in all the contexts outside of CS classrooms that Computational Thinking (CT) truly shines with its generativity. From music, mathematics, social studies, history, language arts and throughout the sciences and engineering, curricular ideas can come alive with CT. Just as in disciplinary research in each of these fields, where computational thinking advances both everyday practice and its innovations, there is a role for pedagogical innovation in curriculum design and teaching of other subjects through integration in subject classrooms, while also providing rich and varied contexts for developing CT competencies. Drawing on a rich palette of real classroom examples from her own extensive research spanning PreK-12 as well as the field more broadly, Dr. Grover will share a suite of pedagogical strategies for meaningful integration of CT in disciplinary learning in K-12 classrooms. The keynote also highlight the challenges that are commonly encountered in this endeavor— including (but not limited to) teacher preparation and assessment of learning in such integrated settings—and ideas to address them.

#### ***Speaker Bio***

A computer scientist and learning scientist by training, Dr. Shuchi Grover's work in computing education in both formal and informal learning settings has spanned US, India and Europe. Her current research centers on computational thinking (CT), computer science (CS) education, and STEM+Computing integration mainly in formal K-12 settings.

Formerly a senior research scientist at SRI International, Dr. Grover is a recipient of several grants from the US National Science Foundation to conduct research on CT learning and assessment in varied PK-12 contexts including introductory CS education and STEM classrooms that integrate CS and CT. She also works at the intersectional space between learning, assessment and big data analytics to shape future environments for deeper learning with embedded assessment.

Dr. Grover's commitment to shaping both research and practice is evident in her outreach work. She has authored highly cited scholarly papers, book chapters, blog posts, and mainstream articles on the topic of CT and CS education in K-12 education. She is advisor to the national K-12 CS Framework (k12cs.org) in the US, a member of the ACM Education Council and the Computer Science Teachers Association's task force on Computational Thinking, on the editorial board of ACM Transactions on Computing Education, and an advisor to K-12 school districts on CS implementation/integration.

She has a Ph.D. in Learning Sciences and Technology Design (focused on computer science education) from Stanford University, an Ed.M (Technology, Innovation, and Education) from Harvard University, and undergraduate and graduate degrees in computer science.

**Keynote Speech (4)****Assessing Computational Thinking in PISA****Date** : 20 August, 2020 (Thursday)**Time** : 15:50 – 16:50 (HKT)**Venue** : Room 1


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**Speaker: Dr. PIACENTINI, Mario**  
**(Programme for International Student**  
**Assessment (PISA),**  
**Organisation for Economic Cooperation and**  
**Development (OECD), France)**

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**Moderator: Prof. KONG, Siu-cheung**  
**(The Education University of Hong Kong, Hong Kong)**

***Speech Abstract***

The presentation will illustrate current work to integrate computational thinking in the Programme for International Student Assessment (PISA). PISA is the largest comparative study of student performance, and now collects at each cycle data for over 600.000 students in 80 countries. As such, it continues to have a significant impact on the definition of the competences that education systems should prioritise. Including computational thinking in the PISA frameworks can thus provide more impetus to reforms of curricula and teacher training that assign a greater focus to this crucial set of skills, within and outside computer science courses.

The presentation will focus on two developments. The first is the inclusion of a limited number of items targeting computational thinking in the PISA 2021 mathematics test. The second, more comprehensive effort is the design of the innovative assessment of ‘Learning in the Digital World’ for the PISA 2024 cycle.

In this new domain, students will be asked to develop computational models of complex phenomena and produce or debug algorithmic solutions to problems, using a combination of thinking skills that include abstraction, generalisation and decomposition. The presentation will present some of the approaches and tools that are being experimented, and engage participants in reviewing prototypes of assessment tasks.

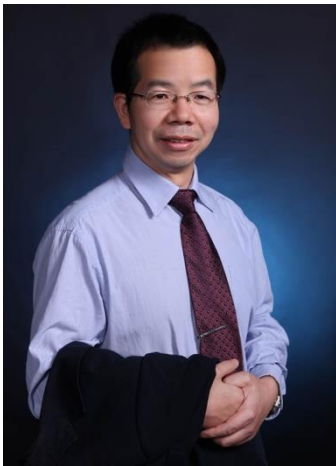
***Speaker Bio***

Mario Piacentini is a senior analyst working in the Programme for International Student Assessment (PISA) at the OECD. An expert in measurement, Mario leads the work on the PISA innovative assessments. He coordinates interdisciplinary groups of experts working together on

defining complex, transversal competences and designing digital tasks that elicit valid evidence on these competences. This project aims to broaden and deepen how we define successful education systems.

He is the main author of the Global Competence (PISA 2018) and Creative Thinking (PISA 2021) assessment frameworks. He is now leading the development of the PISA 2024 assessment of Learning in the Digital World, that focuses on computational thinking. He also coordinates research aimed at making a better use of technology in assessment.

Before joining PISA, he worked for the Public Governance Directorate and the Statistics Directorate of the OECD, the University of Geneva, the World Bank and the Swiss Development Cooperation. Mario led international measurement projects on education, gender, urbanisation, migration and entrepreneurship. He authored several peer-reviewed articles and reports, including the first PISA report on the well-being of students. Mario holds a PhD in economics from the University of Geneva.

**Invited Speech (1)****The Five Issues to Facilitate Students Develop Innovative Algorithm for Solving Complex Authentic Problems****Date** : 20 August, 2020 (Thursday)**Time** : 14:50 – 15:50 (HKT)**Venue** : Room 1**Speaker: Prof. HUANG, Ronghuai****(Beijing Normal University, China)****Moderator: Prof. SHIH, Ju-ling**  
**(National Central University, Taiwan)*****Speech Abstract***

Artificial intelligence (AI) is the science and engineering of making intelligent machines, especially intelligent computer programs that exhibit characteristics associated with intelligence in human behavior including among other faculties of reasoning, learning, goal seeking, problem solving, and adaptability. With the development of AI technology and widely use of AI technology in lots of sectors in society, it is urgent to prepare students for an “Intelligent” world by arming them with AI theories and practices.

However, lots of problems in curriculum, teachers, and algorithm cases exist for conducting AI education in schools. Firstly, the curriculum includes too much theories and frameworks, but few practical cases which may not suitable for pupils; secondly, teachers often don’t have the basic knowledge and practical experience of AI, and lack methods to implement computational thinking in teaching; thirdly, algorithm cases are often complex and the applicable scenarios are generally not connected with students’ life.

In order to solve the above problems and to facilitate students to develop innovative algorithm, the five issues of open data sets, authentic problem sets, basic algorithm sets, open source platform, and incentive mechanism are considered as the core matters. The keynote will discuss the five issues, and showcase the “Youth Artificial Intelligence Innovation Initiatives” platform that is designed under the guidance of the five issues.

***Speaker Bio***

Ronghuai Huang is a Professor in Faculty of Education of Beijing Normal University (BNU). He has being engaged in the research on smart learning environment, artificial intelligence in

education, educational technology as well as knowledge engineering. He received ‘Chang Jiang Scholar’ award in 2016, which is the highest academic award presented to an individual in higher education by the Ministry of Education of China. He serves as Co-Dean of Smart Learning Institute, Director of UNESCO International Rural Educational and Training Centre, and Director of China National Engineering Lab for Cyber learning Intelligent Technology. He is very active in academic organizations both at home and abroad. He is also Committeeman of the Science Subject Expert Committee of the National Textbook Committee, Co-Leader of Information and Communication Technology Course Standard Group in Ordinary Senior High School, Vice-Chairman of China Educational Technology Association, Vice-Chairman of Teaching Guidance Committee of Educational Technology at Institutions of Higher Education, Vice-Chairman of Beijing Education Informatization Expert Committee, and Expert of MOE AI Innovation Panel. He is also President of The Global Chinese Society for Computers in Education, Vice President of International Association of Smart Learning Environments, and Editor-in-Chief of Springer’s Journal of Smart Learning Environment and Journal of Computers in Education. Till now, he has accomplished and is working on over 100 projects, and his ideas have been widely spread, with about 400 academic papers and over 40 books published at home and aboard.

**Invited Speech (2)****Fostering Digital Creativity in Primary School:  
Lessons Learned From a Large-scale Longitudinal Study of the CoolThink@JC Pilot****Date** : 21 August, 2020 (Friday)**Time** : 09:30 – 10:30 (HKT)**Venue** : Room 1**Speaker: Ms. SHEAR, Linda****(SRI Education, SRI International, The United States)****Moderator: Mr. LAI, Daniel  
(The Hong Kong Jockey Club, Hong Kong)*****Speech Abstract***

In 2016, the CoolThink@JC Pilot initiative set an ambitious agenda: to bring computational thinking (CT) education and digital creativity to students in 32 of Hong Kong's primary schools. With a comprehensive suite of lessons, extensive and ongoing professional development opportunities, and in-class teaching supports, CoolThink@JC aims to create a new paradigm for CT at the primary level, both within and beyond Hong Kong, that will prepare students to be active contributors to society in the digital age.

This talk will report on the findings from a rigorous study of this pilot initiative over three years of instruction for students in Primary 4-6. This comprehensive study evaluated the outcomes of the initiative in terms of students' computational thinking concepts, practices, and perspectives, along with an implementation study that captured the voices of teachers, principals, and students to inform both the ongoing continuous improvement of the CoolThink resources and the supports that will be needed for successful adoption at scale.

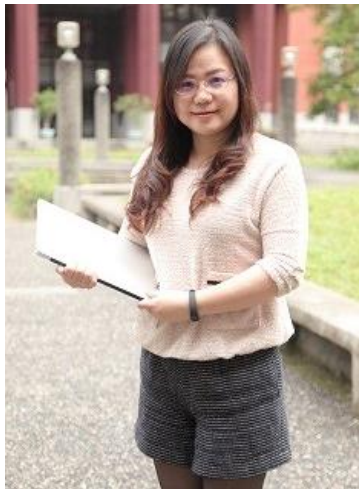
The presentation will also introduce the novel set of assessments that this study used to measure not only students' programming knowledge, but also their developing abilities in logical thinking, problem solving, and other important skills that are key to students' productive futures as innovators and digital creators.

***Speaker Bio***

Linda Shear is the Director of Commercial and International Studies in SRI Education at SRI International, and leads evaluation research for CoolThink@JC. She has directed numerous studies of educational technology evaluation and school/system reform, both in the U.S. and internationally, and has supported foundations and nonprofits in strategic planning and theory of



change development. She directed research and professional development for ITL Research, a multinational research collaboration to investigate and promote innovative teaching and learning, and has brought related professional development programs to countries around the world. She is currently leading a large-scale study of the adoption of 1:1 technology in over 100 of the most economically challenged schools and communities in the United States. Linda was an undergraduate at Princeton University and did her graduate training in Education at the University of California, Berkeley.

**Invited Speech (3)****How Students Experience the Computational Thinking Process when Playing the Board Game - Robot City****Date** : 21 August, 2020 (Friday)**Time** : 13:40 – 14:40 (HKT)**Venue** : Room 1

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**Speaker: Prof. HSU, Ting-Chia****(National Taiwan Normal University, Taiwan)**

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**Moderator: Prof. LI, Robert Kwok-yiu**  
**(City University of Hong Kong, Hong Kong)*****Speech Abstract***

This talk will share the development process of the computational thinking board game. Then, the empirical studies will be shared. The studies utilized the computational thinking educational board game named “Robot City” as the instructional material. The purpose was to achieve high interaction and high-level thinking with the board game, and to help students learn the logics of structural programming and cultivate their computational thinking. The board game was able to provide students with additional augmented reality and multimedia teaching. After several instructional experiments were conducted, the students were found to make significant progress. The studies found that the creative self-efficacy of the students was presented well when playing the computational thinking board game. These studies revealed that proper cognitive load was helpful for learning achievement, but if the students are provided with too much information, such as integration of teacher-centered multimedia instruction and a student-centered augmented-reality learning system to support computational thinking learning at the same time, the students would be given too much information, which would interfere with their concentration on paired logic thinking and collaboration. In addition to human-computer interaction, the studies suggest that the game should mainly strengthen the interaction between people and prevent students from ignoring the connection or collaboration among humans, resulting in dispersing the learning effectiveness of the original board games when they are confronted with too much multimedia. How the students experience the computational thinking process when playing the board games was also explored.

***Speaker Bio***

Ting-Chia Hsu (also known as Ching-Kun Hsu) is a Distinguished Professor in the Department of Technology Application and Human Resource Development in National Taiwan Normal

University. Her research interests include educational technology and computer education. She was granted a research project at the National Institute of Education, Singapore in 2011 by the Taiwan Ministry of Education. She was a visiting faculty at the Computer Science and Artificial Intelligence Lab, Massachusetts Institute of Technology, USA in 2019, and was granted an abroad research project by Taiwan Ministry of Science and Technology. She was a recipient of the National Taiwan Normal University Academic Excellence Awards from 2014 to 2020. Dr. Hsu is also the editor of the official set of text books for the compulsory education of the Information Technology subject in junior high schools in Taiwan, the market share of which exceeds 30% among the four publishers passing the text-book reviews. The Ministry of Science and Technology granted her the Distinguished Young Scholars Project from August 1, 2014 to July 31, 2016 and from August 1 2016 to July 31, 2019. She gained the Special Outstanding Talent Award from the Ministry of Science and Technology from August 1, 2015 to July 31, 2020. She received the Ta-You Wu Memorial Award from the Ministry of Science and Technology in Taiwan in 2018. She was also selected as the winner of the Early Career Researcher Award 2018 in the Asia-Pacific Society for Computers in Education.

*vi. International Forum on Professional Development of Teacher  
for Practicing Computational Thinking Education in K-12*

**Date** : 19 August, 2020 (Wednesday)

**Time** : 16:00 – 17:00 (HKT)

**Venue** : Room 1



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**Panelists:**

**Prof. LOOI, Chee-kit (Nanyang Technological University, Singapore)**

**Prof. MILRAD, Marcelo (Linnaeus University, Sweden)**

**Prof. SHIH, Ju-ling (National Central University, Taiwan)**

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**Moderator: Prof. KONG, Siu-cheung**  
**(The Education University of Hong Kong, Hong Kong)**

***Abstract***

Teachers play a critical role in the success of every educational initiative, as they are the frontline practitioners who transform the educational beliefs into pedagogical practices for classroom realization. Computational thinking education (CTE) is a growing initiative in K-12 schools over the world, due to the increasing demand of next generation who skillfully apply computational thinking (CT) to solve daily problems in the digitalized society. For the successful implementation of CTE, teachers need to understand well the concepts, practices, and perspectives necessary for CT development; adopt suitable pedagogical frameworks and strategies for CT development in school curricula; and use suitable assessment methods and instruments to track students' progress and outcome in CT development. These are important focuses in teacher professional development for CTE in K-12. This forum serves a platform for an insightful discussion about these important issues, for better preparing school teachers to effectively practice CTE in K-12.

*vii. International Forum on Implementation of Computational  
Thinking Education in K-12*

**Date** : 20 August, 2020 (Thursday)

**Time** : 11:40 – 12:40 (HKT)

**Venue** : Room 1



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**Panelists:**

**Prof. HUANG, Ronghuai (Beijing Normal University, China)**

**Prof. IYER, Sridhar (Indian Institute of Technology Bombay, India)**

**Dr. SO, Hyo-Jeong (Ewha Womans University, South Korea)**



**Moderator: Prof. KONG, Siu-cheung  
(The Education University of Hong Kong, Hong Kong)**

***Abstract***

Computational thinking education (CTE) is an important agenda in K-12 schools in the 21st century, for equipping young students with computational thinking (CT) to meet challenges in the digitalized society. The successful implementation of CTE in K-12 schools needs a holistic plan with coherent strategies in the aspects of curriculum development, teacher development, and parental education. This forum serves as a platform to provide an international perspective on these important aspects for CTE implementation in K-12. Speakers from different countries/regions will share insights of the major practices, existing challenges and future plans for CTE implementation in K-12 schools in their own countries/regions. Discussions will focus on the critical issues for accommodating needs of K-12 schools for suitable curriculum integration to deliver CTE elements across different grades; professional development for teachers to cultivate students' CT development in school; and educational campaigns for parents to support students' CT development outside school.

### *viii. Workshop on Learning Analytics for Supporting and Developing Computational Thinking Education*

**Date** : 21 August, 2020 (Friday)  
**Time** : 14:40 – 15:40 (HKT)  
**Venue** : Room 2



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#### **Speakers:**

**Prof. KONG, Siu-cheung (The Education University of Hong Kong, Hong Kong)**

**Dr. LIU, Bowen (The Education University of Hong Kong, Hong Kong)**

**Prof. MILRAD, Marcelo (Linnaeus University, Sweden)**

**Prof. SPECHT, Marcus (Technical University of Delft, The Netherlands)**

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#### ***Workshop Summary***

The value of interdisciplinarity is a recurrent issue in the educational settings, and often at the core of the rationale for designing and implementing innovation in education. In the 21st century, Computational Thinking (CT) can be seen as a fundamental competence for all citizens, involving concepts, practices and dispositions regarding user constructions with digital media (Grover & Pea, 2018). Programming is seen in this context as a central feature of CT involving specific concepts, such as conditionals, loops, recursion. Therefore, CT education is usually combined with programming activities. One of the main challenges in assessing knowledge and skills related to CT Education is the need to provide tools that support educators in the evaluation of students' work, the ideas they create and the code they generate. Methods and tools that allow learners to support themselves are also at the core of these challenges. Educators and engineers have devoted much effort to develop such methods and tools.

Intelligent Tutoring Systems (ITS) in education, and especially programming, can be used to model learner behavior and problem solving in programming environments. In recent years, indicators from Cognitive Psychology, Learning Sciences and Computer Science have been used in interdisciplinary projects to understand the development of CT. In addition to ITS,

different Learning Analytics (LA) techniques and tools can be used to check the learning progression of students using performance-based assessment on CT development, and to make sure they get immediately feedback for their CT development. With the development of these educational techniques, patterns and cues in the learning-related data can be extracted for the assessment of computational practices. These techniques enable performance-based assessment of CT development, and make it practical to provide real-time support to learners. In this workshop we will discuss and illustrate some of these ideas and techniques by first defining the core problems in this field, followed by different research efforts that are underway.

## *ix. The 5th International Conference on Computational Thinking and STEM Education 2021 (CTE-STEM2021)*



We welcome you to join us in Singapore for the 5<sup>th</sup> International Conference on Computational Thinking and STEM Education 2021 conference (CTE-STEM2021). It will be held as a physical conference or an online conference or a hybrid one combining both physical and online, depending on how the Covid-19 situation improves over the coming months.

This conference will build on the successes of the previous Computational Thinking in Education conferences held in Hong Kong for the past 4 years. Next year, we are expanding to include educators and researchers in STEM education to share innovations, ideas, and practices in the conference.

A teacher forum will be organised for teaching practitioners to share their practices in teaching Computational Thinking, Computing and STEM in the classroom. We believe bringing all these would create enriching experiences for educators and researchers to share, learn and innovate approaches to learning through Computational Thinking and STEM education.

<b>Hosting institution:</b>	<b>National Institute of Education, Nanyang Technological University, Singapore</b>
<b>Dates:</b>	<b>2-4 June 2021</b>
<b>Website:</b>	<b><a href="http://cte-stem2021.nie.edu.sg">http://cte-stem2021.nie.edu.sg</a> (check for more information to be released)</b>
<b>Supporting universities and organizations:</b>	<b>Asia-Pacific Society for Computers in Education (APSCE), The Education University of Hong Kong, CoolThink@JC</b>





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