



The 7th APSCE International Conference  
on Computational Thinking  
and STEM Education 2023

# CTE-STEM

2023.6.7-6.9  
Zhongli, Taiwan

Conference  
Programme  
Handbook

# CTE-STEM



The 7th APSCE International  
Conference on Computational Thinking  
and STEM Education 2023

**Programme Handbook of International Conference on  
Computational Thinking and STEM Education 2023  
(CTE-STEM 2023)**

**7th– 9th June 2023**

**NATIONAL CENTRAL UNIVERSITY, TAIWAN**

**Organized by**

Asia-Pacific Society for Computers in Education (APSCE)

## **ABOUT THE NATIONAL CENTRAL UNIVERSITY (NCU), TAIWAN**

National Central University (NCU) is an university with long-standing traditions in Taiwan. Founded in Nanjing in 1915, NCU was the leading academic center in the Southeast China; the phrase “North the Peking University; South the Central University” at that time revealed the significance of NCU. NCU was later re-established in Taiwan in 1962 and started the development on the basis of Geophysics. After our endeavor over 50 years, NCU has expanded its school size and had great achievements both in academic and research development. NCU is now one of the leading universities in Taiwan.

In addition to constantly making breakthroughs in academic fields, NCU puts emphasis on holistic education, providing students with a platform for self-learning and the realization of their creativity. We also conduct industry-university collaboration and interaction to enable students to engage themselves in autonomous learning, to equip them with professional skills, and to help them develop multiple interests during their study at NCU.

NCU is a campus of tranquility with numerous pine trees scattering over the place. On the wave of global green economy, NCU builds an environment-friendly green campus based on our solid foundations of sustainable development. Meanwhile, the first Kunqu Museum in Taiwan will be open to the public in 2017. The museum symbolizes the abundant resources in humanities and also builds a bridge between the humanities and sciences for the faculty and students.

“Sincerity in knowledge; simplicity in life” is the motto of NCU, and it is the spirit that we expect all our students to keep in mind for a lifetime. In addition to achieving outstanding performances in their professions, students should be able to think reflexively, fit into the society maturely and considerately, and keep the down-to-earth attitude of NCU. We aim to lead our faculty and students to create a learning environment with both strong humanistic concerns and academic research on this beautiful and culturally-rich campus, to provide students with global vision and diverse learning experiences, and to become one of the world’s top universities with unique characteristics.

For more information, please visit: <https://www.ncu.edu.tw/en/index.php>



The **Asia-Pacific Society for Computers in Education (APSCE)** was formed on 1 January 2004. It is an independent academic society whose broad objective is to promote the conduct and communication of scientific research related to all aspects of the use of computers in education, especially within the Asia-Pacific.

**The specific objectives of APSCE are:**

- To promote the conduct and dissemination of research employing the use of computing technologies in education within the Asia-Pacific region and internationally.
- To encourage and support the academic activities of researchers in member countries and to nurture a vibrant research community of younger as well as more experienced researchers.
- To enhance international awareness of research conducted by researchers in member countries.
- To obtain greater representation of active researchers from the Asia-Pacific region in committees of related leading academic and professional organizations and the editorial boards of reputable journals.
- To organize and hold the International Conference on Computers in Education (ICCE) conference series in member countries.
- To engage in other appropriate academic and professional activities including but not limited to the setting up of Special Interest Groups (SIGs) and the publication of a Society newsletter and a Society journal.

For more information, please visit: <https://new.apsce.net/>

## ***Preface***

The 7th APSCE International Conference on Computational Thinking and STEM Education 2023 (CTE-STEM 2023) is organized by the Asia-Pacific Society for Computers in Education (APSCE). CTE-STEM 2023 is hosted by the National Central University, Taiwan (NCU). This conference continues from the success of the previous six international Computational Thinking conferences organised by the Education University of Hong Kong (EdUHK), CoolThink@JC in Hong Kong, National Institute of Education, Nanyang Technological University (NIE/NTU) and LDE-CEL at the TU Delft in the Netherlands. In this conference, we invite Computational Thinking and STEM researchers and practitioners to share their findings, processes and outcomes in the context of computing education or computational thinking.

CTE-STEM 2023 is a forum for worldwide sharing of ideas as well as dissemination of findings and outcomes on the implementation of computational thinking and STEM development. The conference will comprise keynote speeches, invited speeches, panel discussions, workshops and paper presentations. All accepted papers will be published in ISSN-coded proceedings. The International Teachers Forum is organized 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.

On behalf of APSCE, NCU and the Conference Organizing Committee, we would like to thank all the invited panelists, the keynote and invited speakers, as well as paper presenters for their contribution to the success of CTE-STEM 2023.

We sincerely hope all of you will enjoy and be inspired from participating in and attending CTE-STEM 2023.

### **Conference Chair**

Wei-qin Chen, Oslo and Akershus University, Norway

### **International Program / Local Organizing Committee Chair**

Ju-Ling Shih, National Central University, Taiwan

### **International Program Committee Co-Chair**

Tak-Wai Chan, National Central University, Taiwan

Siu-Cheung Kong, Education University of Hong Kong, Hong Kong

Chee-Kit Looi, Education University of Hong Kong, Hong Kong

## **Main Theme and Sub-themes**

**“Computational Thinking and STEM Education”** is the main theme of CTE-STEM 2023 which aims to keep abreast of the latest development of how to facilitate students’ computational thinking abilities and STEM development, in the context of computing education or computational thinking. The conference also aims to disseminate findings and outcomes on the implementation of CT development in school and STEM education. There are 19 sub-themes under CTE-STEM 2023, namely:

- Computational Thinking & Coding Education in K-12
- Computational Thinking & Unplugged Activities in K-12
- Computational Thinking & Subject Learning & Teaching in K-12
- Computational Thinking & Teacher Development
- Computational Thinking & IoT
- Computational Thinking & STEM/STEAM Education
- Computational Thinking & Data Science
- Computational Thinking & Artificial Intelligence Education
- Computational Thinking Development in Higher Education
- Computational Thinking & Special Education Needs
- Computational Thinking & Evaluation
- Computational Thinking & Non-formal Learning
- Computational Thinking & Psychological Studies
- Computational Thinking in Educational Policy
- STEM Learning in the Classroom
- STEM Activities in Informal Contexts
- STEM Education Policies
- STEM Pedagogies and Curriculum
- STEM Teacher Education and Professional Development

### Paper Submissions to CTE-STEM 2023

The conference received a total of 37 submissions (16 full papers, 15 short papers and 6 poster papers) by 107 authors from 17 countries/regions (see Table 1)

Country/ Region	No. of Authors	Country/Region	No. of Authors
Belgium	1	Netherlands	9
Germany	1	New Zealand	1
Greece	1	Singapore	4
Hong Kong	21	South Korea	1
India	5	Spain	2
Indonesia	1	Sri Lanka	4
Israel	3	Taiwan	25
Japan	8	United States	14
Malaysia	6	Total	106

The International Programme Committee (IPC) is formed by 51 members and 7 co-chairs worldwide. Each paper with author identification anonymous was reviewed by at least three IPC Members or co-chairs. Meta-reviewers then made recommendation on the acceptance of papers based on IPC Members' reviews. With the comprehensive review process, 26 accepted papers are presented (8 full papers, 12 short papers and 6 poster papers) at the conference.

## ***Keynote Speakers***

Prof. Yasmin Kafai

Teaching, Learning, and Leadership Division –

University of Pennsylvania

Title: Preparing the Next Generation of Computational Thinkers



### **Abstract:**

During the last decade, national initiatives around the world have introduced computing into K-12 education under the umbrella of computational thinking. While initial efforts have focused on computational thinking's relevance for college and career readiness, more recent efforts also include creative expression, social justice, and critical inquiry, leading to a reevaluation of what it means for learners to be computationally-literate in the 21st century. Currently, three framings for promoting computational thinking in K-12 education have been proposed, emphasizing either (1) skill and competency building, (2) creative expression and participation, or (3) social justice and reflection. While each of these emphases is valuable and needed, their narrow focus can obscure important issues and miss critical transformational opportunities for empowering students as competent, creative, and critical agents. In this talk, I suggest that these framings should be seen as complimentary and suggest a move towards computational literacies, thereby historicizing and situating computer science with respect to broader educational concerns and providing new directions for how schools can help students to actively participate in designing their digital futures.

### **Biography:**

Yasmin Kafai is the Lori and Michael Milken President's Distinguished Professor at the University of Pennsylvania. She is a researcher and developer of tools, communities, and materials to promote computational participation, crafting, and creativity across K-16. Her book monographs include "Connected Code: Why Children Need to Learn Programming" (The MIT Press, 2014) and editions such as the upcoming "Constructionism in Context: The Art, Theory, and Practice of Learning Designs" (2019, The MIT Press). She co-authored the 2010 "National Educational Technology Plan" for the US Department of Education and the 2018 "Priming the Computer Science Teacher Education Pump" reports. Kafai earned a doctorate in education from Harvard University while working with Seymour Papert at the MIT Media Lab. She is an elected fellow of the American Educational Research Association and the International Society for the Learning Sciences.



## Keynote Speakers

Prof. Aman Yadav

Educational Psychology & Educational Technology –  
Michigan State University

Title: Computational Thinking in the Classroom: Teachers'  
Implementation Approaches across a Spectrum



### Abstract:

Since Wing re-popularized Computational Thinking (CT) to bring computational tools and practices in primary and secondary school, researchers and educators have implemented CT multiple ways across number of disciplines. In this talk, Dr. Yadav will discuss what the goals of CT should be and the opportunities and pitfalls to integrate CT into content areas. Specifically, he will discuss how teachers see the relevance of CT to support their pedagogical goals and how they take up computational thinking within their instruction. The talk will draw upon several projects that have focused on supporting teachers to integrate computational thinking at the primary (ages 5-10) and middle school (ages 11-14). Dr. Yadav will use classroom examples to highlight teachers' implementation of CT and pedagogical tensions that emerge between CT and disciplinary practices. In addition, Dr. Yadav will also discuss the importance of connecting computational learning experiences to students' backgrounds, experiences, and interests rather than teaching CT isolated from students' lives.

### Biography:

Dr. Aman Yadav is a Lappan-Phillips Professor of Computing Education in the College of Education and College of Natural Science at Michigan State University with extensive experience in research, evaluation, and teacher professional development. His areas of expertise include computer science education, problem-based learning, and online learning. His research and teaching focus on improving student experiences and outcomes in computer science and engineering at the K-16 level. His recently co-edited book, [Computational Thinking in Education: A Pedagogical Perspective](#) tackles how to integrate computational thinking, coding, and subject matter in relevant and meaningful ways. His work has been published in several leading journals, including ACM Transactions on Computing Education, Journal of Research in Science Teaching, Journal of Engineering Education, and Communications of the ACM. Twitter ([@yadavaman](#)), website (<http://www.amanyadav.org>)

## ***Keynote Speakers***

Prof. Pasi Silander

Department of Teacher Education - University of Helsinki

Title: New Perspectives to AI and Computational Thinking  
Education via Phenomenon-based STEAM-projects: The  
Necessity of New Praxis for Epistemic Fluency



### **Abstract:**

Modern societies rely heavily on advanced technologies, such as artificial intelligence (AI) and data analytics. In order to understand the role of automatic decision making and machine learning (ML) e.g. in social media, in economics, or in hybrid influencing, students will need computational thinking skills focused on AI.

Computational thinking focused on understanding the role of artificial intelligence and machine learning cannot adequately be learned through traditional methods used in schools. Therefore, there is an urgent need to rethink and redesign computer thinking education in K-12. Phenomenon-based learning is one of the most promising new pedagogical approaches and is widely used in schools in Finland. Phenomenon-based learning has been successfully implemented, for instance, in STEAM (science, technology, engineering, arts, math) education and in co-invention projects.

Computational thinking is not only important for computing, but it is also a highly generalized cognitive skill needed for critical thinking, media literacy, and knowledge production, as well as for comprehending ethical issues related to data-driven society and various aspects of AI and its ethically sustainable use.

The utilization of computational thinking in K-12 education is anchored in our conceptions of emerging digital technology, theories of learning, and technology-mediated practices of learning and teaching. It appears to us that computational thinking focused on AI requires a new level of epistemic fluency, interconnecting abstract and real-life phenomena by learners and teachers. When considering pedagogical applications of computational thinking in K-12 education, it is not enough to address mere programming or coding. The focus should be on modelling and understanding real-world phenomena by designing, creating, and utilizing abstractions and by creating algorithms, simulations and utilizing principles of machine learning. In addition, the focus of learning should be on systemic thinking, as in system theories or system design.

The major challenge of the K-12 educational system globally is to help students develop critical thinking skills and creative capabilities, especially related to understanding artificial intelligence and machine learning. In the digital world in which we live, computational thinking skills are a prerequisite for critical thinking and ensuring democracy.

**Biography:**

Pasi Silander, an educational futurist, is a computer scientist and an expert on digitalization. He also has a background in learning psychology and in pedagogy. He has worked long-time as a researcher and developer of eLearning, and he has created new innovative concepts, pedagogical models and design methods that are widely used in the Finnish education system. He is one of the original developers of phenomenon-based learning and teaching methods (PhenoBL).

The objects of research and development have included pedagogical leadership, digital transformation in education, phenomenon-based learning, STEM, innovative digital learning environments, as well as AI in education and Learning Analytics (LA). The research and development have taken place both in the business and public sector as well as in the research sector. In addition, he has authored many books focused on digital transformation in education and how to create the school of the future.

Silander has led the digitalization process of the Helsinki City school district (including around 120 schools), a systemic development process of new digital learning and teaching culture. Currently he is leading the development artificial intelligent and learning analytics for education.

Website: [www.phenomenaleducation.info](http://www.phenomenaleducation.info)

## ***Keynote Speakers***

Prof. Chun-Yen Chang

Science Education Center - National Taiwan Normal  
University

Title: Bilingual STEM Education for Global  
Competitiveness in New Asia



### **Abstract:**

To forge Taiwan's global competitiveness, the government released a "Bilingual 2030" policy, which encompasses the needs of accelerating bilingual higher education, optimizing bilingual conditions for primary and secondary schools, developing digital learning, and expanding affordable English proficiency tests. Funded and fueled by the Bilingual 2030 policy, a network project collaborating with University College London, Institute of Education (UCL-IOE) has been conducted by NTNU to establish a series of academic exchange activities. The primary theme of this project is "STEM education for global citizenship," focusing on improving students' computational thinking, mathematical understanding, and language acquisition. Previous studies by UCL-IOE have revealed that well-constructed STEM programs (ScratchMaths & Cornerstone Maths) can utilize the strengths of computational training to benefit specific mathematical concepts such as algebra, geometry, and ratio. To seek promising curriculum units suitable for adaption to a bilingual context, we operated a sequence of computer-based tasks derived from the ScratchMaths curriculum developed by U.C.L. Knowledge Lab. We explore whether dynamic mathematical technology, teacher materials, and professional development will enable teachers and students to grasp interdisciplinary knowledge and achieve deep learning. The intervention significantly improved students' computational knowledge (programming) and mathematical concepts (geometry). Students' motivations for learning STEM in the bilingual context were also fostered. The initial study's main implication demonstrates the potential of bilingual STEM tasks to provide a scaffolding for learners to exploit multilingual resources to consolidate mathematics and technological concepts and reinforce interdisciplinary interactions. In the future, our group will endeavor to develop sustainable bilingual STEM curriculum units with the consideration of more pedagogical elements, from boosting digital learning procedures to engaging teachers in professional development.

**Biography:**

Dr. Chang, a science education scholar at heart, currently serves at the National Taiwan Normal University (NTNU) as Chair Professor, Director of Science Education Center (NTNU), Professor of the Graduate Institute of Science Education and the Department of Earth Sciences (NTNU). Over the past few years, he has likewise been honored as a Visiting Professor at the Education University of Hong Kong as well as at Paris 8 University. His major research interests include science education, e-Learning, interdisciplinary science learning, and science communication.

Dr. Chang has authored and co-authored more than 150 articles, of which more than 125 are indexed in the Science/Social Science Citation Index (SCI/SSCI) database. He now is the Editor-in-Chief of three journals: (1) Eurasia Journal of Mathematics, Science and Technology Education; (2) European Journal of Mathematics and Science Education; (3) Educational Innovations and Emerging Technologies, as well as on the Editorial Board of three SSCI-level journals: (1) Studies in Science Education (science education); (2) Learning, Media & Technology (learning technology); (3) Journal of Science Education and Technology (science education & technology).

In February 2013, Dr. Chang's catechol-O-methyltransferase (COMT) study was privileged in a report by the New York Times Sunday Magazine and in the news featured on the Association of Psychological Science website. In 2019, the CouldClassRoom (C.C.R.) mobile system he and his research team developed was selected as an exemplar institution in the 2019 EDUCAUSE Horizon Report. For more information, see [here](#).

## *Invited Speech*

Prof. Valentina Dagiienė

Institute of Data Science and Digital Technologies -

Vilnius University

Title: Bebras: a Way to Introduce Computer Science to Students at School



### **Abstract:**

Gamification and Contests play an important role for learners as a source of inspiration, motivation, innovation, and attraction. When students start learning the basic concepts of Computer Science (CS), very soon they can find a place where they are able to demonstrate their skills, share interests, and to compare their work to others. Running competitions in informatics for school students for more than twenty years, we have noticed that the students consider the contest experience very engaging and exciting as a learning experience. Competitions are also very useful and important networking events. Interest in contests essentially depends on the tasks and environment. Attraction, invention, tricks, surprise should be desirable features of each task presented to participants. Generating and designing interesting tasks is one of the most important issues, bringing students into the competition movement. Beaver (in Lithuanian Bebras) is an international initiative whose goal is to promote Informatics (Computer Science) and Computational Thinking among students of all ages, also teachers. At the moment there are 78 member countries Bebras network. Annually the Bebras initiative contains two events: 1) An International Workshop for developing tasks; 2) National Contests/Challenges in all Bebras network countries, usually on the second or third week of November (named as a Bebras week or weeks). The challenge consists of sets of short questions or tasks for various age groups. These tasks can be answered without prior knowledge about Computer Science, but are clearly related to CS concepts. To solve those tasks, students are required to think in and about information, discrete structures, computation, data processing, but they also must use algorithmic concepts and problem solving skills.

### **Biography:**

Valentina Dagiene is Professor at Vilnius University in Lithuania. Her interests include CS teaching and learning strategies, teacher education, puzzle-based learning, intelligent technologies for education, technology enhanced learning, personalisation, and CS curricula development. She has published over 300 scientific papers, and more than 50 textbooks in the field of informatics for schools. She coordinated over 50

national and international projects on CS education. She is working in various expert groups and work groups, organizing olympiads in informatics, chairing conferences and workshops, also engaged in technology enhanced learning and computational thinking. She established International conference on Olympiads in Informatics. In 2004 she established the International Challenge on Informatics and Computational Thinking “Bebras” which runs in more than 60 countries (<http://bebras.org>). V. Dagiene is Editor of two international journals “Informatics in Education” (since 2002) and “Olympiads in Informatics” (since 2007). She is acknowledged by honorary gold medal for contributions to school informatics in Europe established by ETH (Zurich, Switzerland, 2011), and Ada Lovelace Computing Excellence Award by the European Commission’s (in 2016). Website: <https://www.mii.lt/en/structure/staff/408-dagiene-valentina-en-gb>

## ***Panel***

Panelists: Tak-Wai Chan, Siu-Cheng Kong, Yasmin Kafai, Valentina Dagienė

Host: Chee-Kit Looi

Title: Computational Thinking, AI Thinking, Robot Thinking, and. Human Thinking

Computational thinking, artificial intelligence, robotics, and human thinking all represent different paradigms or models of intelligence. This panel will discuss how these ways of thinking intersect and synergize with each other. The panelists will explore how thinking like a computer scientist, and how reflecting on how a robot or AI system works can enhance human creativity. They will also examine problems that require the symbiosis of machine and human intelligence.

The panel aims to gain insights into developing computational thinking skills and fostering synergies between different modes of thinking. This can help inspire students to become active participants in solving real-world problems and shaping the future.

Questions for the Panelist (Each panelist will answer Q1 and choose some of the other questions to respond to):

1. How do computational, AI, robot and human thinking intersect? What are the strengths of each, and how can they mutually enhance one another?
2. What does it mean to "think like an AI" or "think like a robot"? How can these modes of thinking spur human creativity rather than compete with it? What kinds of tasks are best suited for human thinking versus machine thinking?
3. Can you share examples of problems that require synergizing computational, AI and human thinking? How did this interdisciplinary collaboration work? What were the outcomes?
4. How will human thinking need to evolve in the age of increasingly advanced AI and robotics? How can we develop partnerships rather than rivalries between humans and machines?
5. How can interdisciplinary education that combines STEM, arts and humanities help cultivate synergistic thinking across different disciplines? What approaches do you recommend for inspiring students?
6. What is your vision for the future of intelligence - can computational, AI, robot and human thinking co-evolve and achieve greater things together? What will it take to make that vision a reality?



7. What advice do you have for educators seeking to foster synergies between computational, AI, robot and human thinking? What equity and ethical issues and concerns are important?

The panel will be held on 7 June 11.20 am – 12.20 pm. I propose this schedule:

- 4 mins for chair
- 7 mins each for each of 4 panelists:  $7 \times 4 = 28$
- Discussion among panelists: 15 mins
- Open to floor: 10 mins
- 3 mins closure

# ***Conference Organization***

## **CTE-STEM Steering Committee**

Siu-Cheung Kong, Education University of Hong Kong, Hong Kong

Marcus Specht, Leiden Delft Erasmus, the Netherlands

Ronghuai Huang, Beijing Normal University, China

Hiroaki Ogata, Kyoto University, Japan

Weiqin Chen, Oslo and Akershus University, Norway

Jon Mason, Charles Darwin University, Australia

## **Conference Chair**

Weiqin Chen, Oslo and Akershus University, Norway

## **International Program / Local Organizing Committee Chair**

Ju-Ling Shih, National Central University, Taiwan

## **International Program Committee Co-Chair**

Tak-Wai Chan, National Central University, Taiwan

Siu-Cheung Kong, Education University of Hong Kong, Hong Kong

Chee-Kit Looi, Education University of Hong Kong, Hong Kong

## **Local Organizing Committee Co-Chair**

Ying-Tien Wu, National Central University, Taiwan

Tsung-Yen Chuang, National University of Tainan, Taiwan

## **Teacher Forum Committee Chair**

Chang-Yen Liao, National Central University, Taiwan

## **International Programme Committee Members**

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BIST Ankur                      Govind ballabh pant university of agri. and tech.

BOTICKI Ivica                      FER UNIZG

BRINDA Torsten                      University of Duisburg-Essen

CHANG Chi-Cheng                      National Taiwan Normal University

CHANG Li-Chieh                      National Central University

CHANG Shao-Chen                      Yuan Ze University

CHEN Guang                      Beijing Normal University

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CHENG Shu-Chen	Southern Taiwan University of Science and Technology
CHEON Jongpil Cheon	Texas Tech University
CHIANG Tosti H. C.	National Taiwan Normal University
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DAGIENE Valentina	Vilnius university Institute of Mathematics
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KURNIAWAN Oka	Singapore University of Technology and Design
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MASON Jon	Charles Darwin University
MILRAD Marcelo	Linnaeus University
MOLLER Faron	Swansea University
OSMAN Kamisah	The National University of Malaysia
OTERO Nuno	University of Greenwich
ÖZÇINAR Hüseyin	Pamukkale University
RAISINGHANI Vijay	NMIMS
RAJENDRAN Ramkumar	IIT Bombay
SEOW Peter	National Institute of Education
SIN Kuen Fung	The Education Univeristy of Hong Kong
SIT Cindy	The Chinese University of Hong Kong
SONG Ki-Sang	Korea National University of Education
SPECHT Marcus	Delft University of Technology
TSAI Meng-Jung	National Taiwan Normal University
VAHRENHOLD Jan	Westfälische Wilhelms-Universität Münster
WADHWA Bimlesh	National University of Singapore

WU Longkai	National Institute of Education
WU Ying-Tien	National Central University, Taiwan
XU Li	University of Arizona
YANG Jie Chi	National Central University
YETER Ibrahim H.	Nanyang Technological University
YU Y.T.	City University of Hong Kong
ZEIGLER David	California State University, Sacramento
ZHANG Jinbao	Beijing Normal University

## CTE-STEM 2023 Program

June 7 (Wed)		June 8 (Thurs)		June 9 (Fri)	
08:30-09:00	Registration	08:30-09:00	Registration	08:30-09:30	Morning Treats
09:00-10:00	Opening Ceremony	09:00-10:00	Paper Session 2		Poster session
10:00-10:20	Tea Break	10:00-10:20	Tea Break	9:30-10:30	Keynote: Yasmin Kafai Host: Chee-Kit Looi
10:20-11:20	Keynote: Aman Yadav Host: Siu-Cheng Kong	10:20-11:20	Keynote: Pasi Silander Host: Tak-Wai Chan	10:30-11:30	Panel: CTE-STEM Now and Forward Host: Ju-Ling Shih Panelists: Siu-Cheng Kong, Daniel Lai, Ben Chang, Audrey Lin
11:20-12:20	Panel: Computational Thinking, AI Thinking, Robot Thinking, and Human Thinking Host: Chee-Kit Looi Panelists: Tak-Wai Chan, Siu- Cheng Kong, Yasmin Kafai, Valentina Dagienė	11:20-12:20	Keynote: Chun-Yen Chang Host: Yin-Tien Wu	11:30-12:00	Closing Ceremony
12:20-13:20	Lunch Break	12:20-13:20	Lunch Break	12:00-13:00	Lunch Break
13:20-15:20	Paper Session 1	13:20-15:20	Invited Speech: Valentina Dagienė Workshop: Bebras Host: Ju-Ling Shih	13:00-16:00	School Visit: International Interest-Driven Creator Experimental Education Institution
15:20-15:40	Tea Break	15:20-15:40	Tea Break		
15:40-17:30	Teachers Forum Workshop: Bilingual i-STEM Maker: Project-/Problem-based teaching and learning Host: Sheng-Yi Wu	15:40-17:30	Workshop: CT in STEM: Practice and Evaluation Host: Meng-Jung Tsai		
		18:00-20:00	Banquet		

## CTE-STEM 2023 Program

June 7 (Wed)		
08:30-09:00	Registration	
09:00-10:00	Opening Ceremony	A102-1 MEET: <a href="#">apo-ocnr-mou</a>
10:00-10:20	Tea Break	
10:20-11:20	<p><b>Keynote: Aman Yadav - Michigan State University</b>  <b>Computational Thinking in the Classroom: Teachers' Implementation Approaches across a Spectrum</b>  <b>Host: Siu-Cheng Kong</b></p>	A102-1 MEET: <a href="#">apo-ocnr-mou</a>
11:20-12:20	<p><b>Panel:</b>  <b>Computational Thinking, AI Thinking, Robot Thinking, and Human Thinking</b>  <b>Host: Chee-Kit Looi - Education University of Hong Kong</b>  <b>Panelists:</b>  <b>Tak-Wai Chan - National Central University</b>  <b>Siu-Cheng Kong - Education University of Hong Kong</b>  <b>Yasmin Kafai - University of Pennsylvania</b>  <b>Valentina Dagienė - Vilnius University</b></p>	A102-1 MEET: <a href="#">apo-ocnr-mou</a>
12:20-13:20	Lunch Break	
13:20-15:20	<p><b>Paper Session 1</b></p> <p>HOST : Siu Cheung Kong</p> <ul style="list-style-type: none"> <li>● Evaluating a Teacher Development Course in STEM with Artificial Intelligence Model Training: Problem-Solving Skills and Digital Creativity Development -- Siu Cheung Kong <b>(Physical)</b></li> <li>● Abstraction and Problem Solving in a CS Curriculum for 4th Grade -- Mor Friebronn-Yesharim, Ronit Ben-Bassat Levy, Michal Armoni <b>(Virtual)</b></li> <li>● Use Community Problem-Solving to Engage All Students in Computational and Statistical Thinking -- Li Xu <b>(Virtual)</b></li> <li>● Is Computational Thinking Self-Efficacy aligned with Computational Thinking Comprehension? -- Jongpil Cheon, Tianxiao Yang, Seonkwan Han <b>(Physical)</b></li> </ul>	A406 MEET: <a href="#">apo-ocnr-mou</a>
	<p>HOST : Ju-Ling Shih</p> <ul style="list-style-type: none"> <li>● A Review of Learning Progressions in K-12 Computational Thinking Education -- Yutian Ma <b>(Virtual)</b></li> <li>● A Study on Learners' Different Learning Disposition About</li> </ul>	A404 MEET: <a href="#">akm-fpvt-ott</a>

## CTE-STEM 2023 Program

	<p>Cooperative Learning Across Different Languages for Instruction and Learning in the General Education Course on Speculative Reason -- Tzu-Keng Fu, Jung-Ying Fang (Virtual)</p> <ul style="list-style-type: none"> <li>Evaluation of an instructional design for developing computational thinking skills using four-bar linkage bionic robots -- Hsuan-Wen Chen, Ju-Ling Shih (Physical)</li> </ul>	
	<p>HOST : Ting-Chia Hsu</p> <ul style="list-style-type: none"> <li>Associating Learning Engagement with Changes in Computer Science Self-Efficacy in the Context of Game Design and Simulation Creation Activities in Rural Elementary Schools -- Arif Rachmatullah, Carol Tate, Andrea Beesley, Elise Levin-Guracar (Virtual)</li> <li>Teachers' Understanding of Synergies Between Computational and Mathematical Thinking after a Summer Professional Development -- Zuhail Yilmaz, Karmen Williams, Fernando Alegre, Rose Kendrick, Juana Moreno (Virtual)</li> <li>Integrating Engineering Design Process into After-Class STEM Learning in Secondary Education: A Case Study of Two Winning Groups -- Biyun Huang, Morris Jong, Chun-Yu Hou (Virtual)</li> <li>The Learning Effectiveness of the Computational Thinking Instructional Tool named AI2 Robot City and Its Sorting Extended Version -- Ting-Chia Hsu, Wei-Ni Wen, Mu-Sheng Chen, Tai-Ping Hsu (Physical)</li> </ul>	<p>A408 MEET: <a href="http://geg-ntdd-oqo">geg-ntdd-oqo</a></p>
15:20-15:40	Tea Break	
15:40-17:30	<p><b>Workshop: Bilingual i-STEM Maker: Project-/Problem-based teaching and learning</b> Host: <b>Sheng-Yi Wu</b></p> <ul style="list-style-type: none"> <li>Enabling steam possibility &amp; empowering clil practice: a steam-integrated &amp; clil-oriented curriculum design for primary students -- Kuay-Keng Yang, Yi-Hung Liao, Sheng-Yi Wu (Physical)</li> </ul>	<p>A406 MEET: <a href="http://apo-ocnr-mou">apo-ocnr-mou</a></p>
	<b>Teachers Forum</b>	
	<p>HOST : Chang-Yen Liao</p> <ul style="list-style-type: none"> <li>A Critical Review on the use of Computational Thinking (CT) in General Studies to Enhance Students' Interest of Learning.</li> </ul>	<p>A404 MEET: <a href="http://akm-fpvt-ott">akm-fpvt-ott</a></p>

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	<ul style="list-style-type: none"> <li>-- Chau Tin-Yee, Chow Cho-Ting and Huen Yik-Man</li> <li>● Use of GeoGebra Augmented Reality in Teaching and Learning Calculus: Volume of Solids in Integration</li> <li>-- Xia Juan Ye, Joel Yeow Hwee Teoh, Ching Ming Ku (Physical)</li> <li>● The Effect of Visual Programming Environments on the Development of Computational Thinking and the Influence of Self-Regulating Ability in Upper Primary School Children</li> <li>-- Maxim Vansteenkiste, Nardie Fanchamps (Virtual)</li> <li>● Using Scratch Digital Storytelling with Self-Regulated Learning Strategies to Support Primary EFL/ESL School Students in Learning English Writing: From the Perspective of Information Technology Subject</li> <li>-- Wai Lun Mung, Chi Yan Wong, Yungsi Tina Ma (Physical)</li> <li>● Pedagogical reflections on Computational Thinking: Applying the integration of programming and computational thinking to enhance the students' interest and performance in mathematics learning</li> <li>-- Man Sing Hsu and Yuk Yue Vicky Wong (Virtual)</li> <li>● Development of Computational Thinking Education in Primary Schools in Hong Kong: A Case Study</li> <li>-- Kam Yuen Law, Ling Chun Kwong (Physical)</li> <li>● Plugged-In And Unplugged Chemistry Computational Thinking Through Engineering Design Process</li> <li>-- Norhaslinda Abdul Samad, Kamisah Osman, Nazrul Anuar Nayan (Virtual)</li> </ul>	
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June 8 (Thurs)		
08:30-09:00	Registration	
09:00-10:00	<b>Paper Session 2</b>	
	<p>HOST : Stephen J. H. Yang</p> <ul style="list-style-type: none"> <li>● AI with supporting technologies entrusts diversity and inclusion in research issues for underrepresented students in educational applications</li> <li>-- Iza Guspian, Stephen J. H. Yang (Physical)</li> <li>● Scratch programming in science: the impact on Computational Thinking and student achievement</li> <li>-- Samri Chongo, Noraini Lapawi, Hazrati Husnin (Virtual)</li> <li>● An Exploratory Study on the Relationship between Computational Thinking and Motives for Gaming among University Students in Japan</li> </ul>	<p>A406 MEET: <a href="http://apo-ocnr-mou">apo-ocnr-mou</a></p>



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	<p>-- Masanori Fukui, Masakatsu Kuroda, Yuji Sasaki, Tsukasa Hirashima <b>(Physical)</b></p> <ul style="list-style-type: none"> <li>● Designing a Culturally Responsive, Equitable and Inclusive K-12 Curriculum on Computational Thinking and Problem-Solving skills</li> </ul> <p>-- Elavarasi Manogaran, Shoaib Dar <b>(Virtual)</b></p>	
	<p>HOST : Aman Yadav</p> <ul style="list-style-type: none"> <li>● A Study of Students' Computational Thinking and Complex Problem-Solving Skills in the Summit Game</li> </ul> <p>-- Yu-Tang Hung, Tsung-Yen Chuang, Ju-Ling Shih <b>(Physical)</b></p> <ul style="list-style-type: none"> <li>● SELLAM - an interactive educational platform for children to learn programming concepts</li> </ul> <p>-- Lakshitha Wijesinghe, Vinura Perera, Erandi Herath, Prabodha Abeynayake <b>(Virtual)</b></p> <ul style="list-style-type: none"> <li>● Computational Thinking in Elementary Classrooms: Teachers' Understanding of Computational Thinking Practices and Integration</li> </ul> <p>-- Victoria Macann, Ceren Ocak, Aman Yadav <b>(Physical)</b></p> <ul style="list-style-type: none"> <li>● Cultivating Students' Computational Thinking and Digital Literacy in University Courses: A Hong Kong Example</li> </ul> <p>-- Ka Wai Cecilia Chun, Ping Fu Fung, Yat Chiu Law, Kwok Wing Sum <b>(Physical)</b></p>	<p>A404 MEET: <a href="http://akm-fpvt-ott">akm-fpvt-ott</a></p>
10:00-10:20	Tea Break	
10:20-11:20	<p><b>Keynote: Pasi Silander</b> - University of Helsinki New Perspectives to AI and Computational Thinking Education via Phenomenon-based STEAM-projects: The Necessity of New Praxis for Epistemic Fluency Host: Tak-Wai Chan</p>	<p>A413 MEET: <a href="http://apo-ocnr-mou">apo-ocnr-mou</a></p>
11:20-12:20	<p><b>Keynote: Chun-Yen Chang</b> - National Taiwan Normal University Bilingual STEM Education for Global Competitiveness in New Asia Host: Yin-Tien Wu</p>	<p>A413 MEET: <a href="http://apo-ocnr-mou">apo-ocnr-mou</a></p>
12:20-13:20	Lunch Break	
13:20-15:20	<p><b>Invited Speech: Valentina Dagienė</b> - Vilnius University <b>Workshop: Bebras</b> Host: Ju-Ling Shih</p>	<p>A408 MEET: <a href="http://apo-ocnr-mou">apo-ocnr-mou</a></p>
15:20-15:40	Tea Break	
15:40-17:30	<p><b>Workshop: CT in STEM: Practice and Evaluation</b> Host: <b>Meng-Jung Tsai</b></p>	<p>A406 MEET: <a href="http://akm-fpvt-ott">akm-fpvt-ott</a></p>
18:00-20:00	Banquet	

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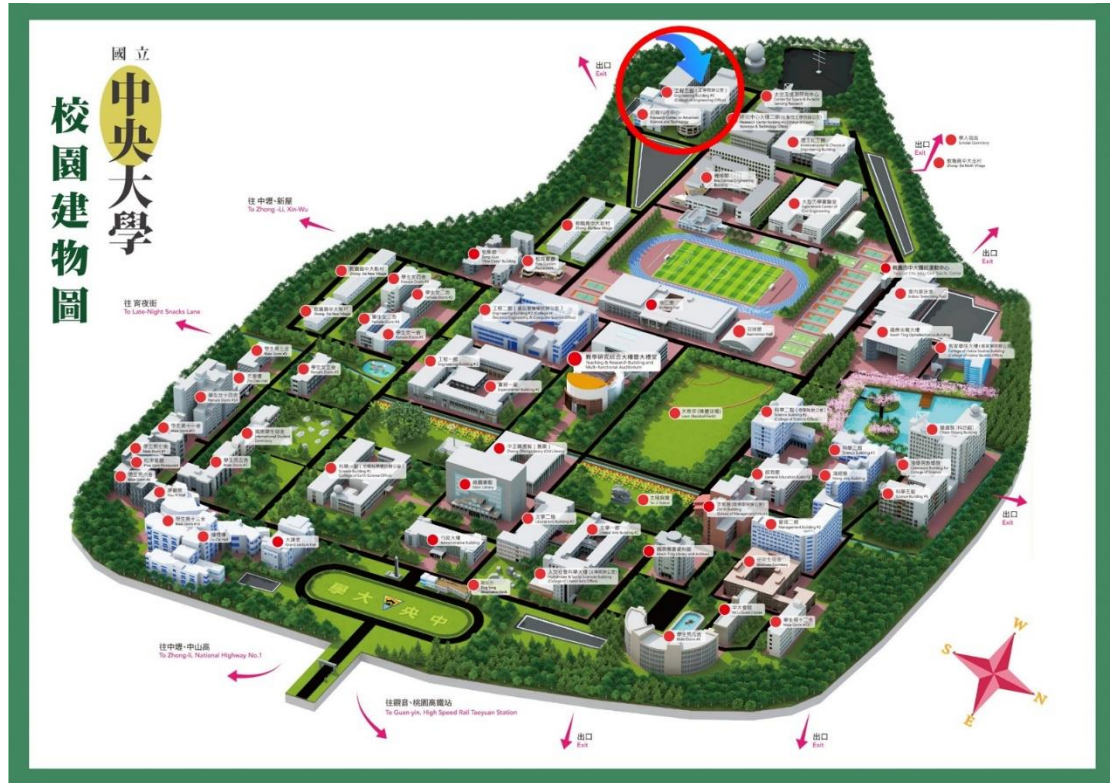
June 9 (Fri)		
08:30-09:30	<p><b>Poster session</b></p> <ul style="list-style-type: none"> <li>● Examining Learner Engagement in Robot-Assisted Language Learning among Third Graders -- Yu-Ching Lin, Vivien Lin, Nian-Shing Chen <b>(Physical)</b></li> <li>● Learning About STEM Concepts in Primary Education by Using Highly Visualised ICT Learning Environments -- Nardie Fanchamps, Renée-Claire Belting, Paul Hennissen, Stefan Mandos, Juliette Passariello-Jansen, Renato Rogosic, Krist Shingjergji, Bart Beaumont <b>(Virtual)</b> MEET: <a href="#">apo-ocnr-mou</a></li> <li>● The Importance of Creativity in Developing Computational Thinking in Primary Education -- Nardie Fanchamps, María Zapata-Cáceres, Estefanía Martin-Barroso, Emily Van Gool <b>(Virtual)</b> MEET: <a href="#">akm-fpvt-ott</a></li> <li>● Designing Coding Problems and Unplugged Activities in Science to Develop Computational Thinking in Sixth Grade Students -- Meghna Singh, Arti Singh, Archana Kapoor <b>(Virtual)</b> MEET: <a href="#">geg-ntdd-oqo</a></li> <li>● A proposal for Implementing Authentic Learning Enhanced with Academic Integrity of STEAM and Entrepreneurship in New Education Normal -- Tosh Yamamoto, Kazuya Takemata, Ayako Tanaka, Akiyuki Minamide <b>(Physical)</b></li> <li>● Learning Assessment of Computational Thinking Digital Game &lt;Captain Bebras&gt; -- Yan-Ming Chen, Ju-Ling Shih <b>(Physical)</b></li> </ul>	A408
9:30-10:30	<p><b>Keynote: Yasmin Kafai - University of Pennsylvania</b>  <b>Preparing the Next Generation of Computational Thinkers</b>            Host: <b>Chee-Kit Looi</b></p>	A413 MEET: <a href="#">apo-ocnr-mou</a>
10:30-11:30	<p><b>Panel:</b>  <b>CTE-STEM Now and Forward</b>            Host: <b>Ju-Ling Shih - National Central University</b>            Panelists:  <b>Siu-Cheng Kong - Education University of Hong Kong</b>  <b>Daniel Lai - The Hong Kong Jockey Club (HKJC)</b>  <b>Li-Chieh Chang - National Central University</b>  <b>Audrey Lin - Interest-DrivenCreator (IDC)</b></p>	A413 MEET: <a href="#">apo-ocnr-mou</a>
11:30-12:00	Closing Ceremony	

# Venue

National Central University, Taiwan

320 No.300, Zhongda Rd., Zhongli Dist., Taoyuan City 32001, Taiwan (R.O.C.)

中央大學 工程五館 (Engineering Building No.5)



## Virtual



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