

WORLD EDUCATIONAL RESEARCH ASSOCIATION

International Research Network “Computational Thinking Education in Primary and Secondary Schools”

Final Three-Year Progress Report (Reporting Period: 1 May 2019 - 30 April 2022)

A. List of IRN Participants

1. KONG, Siu Cheung [Convener]	(The Education University of Hong Kong, Hong Kong)
2. LOOI, Chee Kit [Co-Convener]	(Nanyang Technological University, Singapore)
3. BISWAS, Gautam	(Vanderbilt University, USA)
4. CHAN, Tak-Wai	(National Central University, Taiwan)
5. HOPPE, Ulrich	(University Duisburg-Essen, Germany)
6. HUANG, Ronghuai	(Beijing Normal University, China)
7. JONG, Morris Siu-Yung	(The Chinese University of Hong Kong, Hong Kong)
8. MILRAD, Marcelo	(Linnaeus University, Sweden)
9. NUSSBAUM, Miguel	(The Catholic University of Chile, Chile)
10. OGATA, Hiroaki	(Kyoto University, Japan)
11. SHIH, Ju-Ling	(National Central University, Taiwan)
12. SO, Wing Mui Winnie	(The Education University of Hong Kong, Hong Kong)
13. SPECHT, Marcus	(Technical University of Delft, The Netherlands)
14. SULLIVAN, Florence	(University of Massachusetts Amherst, USA)

B. IRN Activities

(1) Accomplishment of IRN in Year 1 (1 May 2019 - 16 April 2020)

The IRN in Year 1 organized two external panels and held one internal meeting for achieving the IRN-specific research initiatives.

<i>Year 1 Events</i>	<i>Outcomes</i>
<u>1st IRN-specific panel</u> [in CTE 2019] June 12, 2019 // 11:45 am to 12:45 pm // The Education University of Hong Kong, Hong Kong	- Organized an IRN-specific panel for disseminate purposes
<u>2nd IRN-specific panel</u> [in ICCE 2019] December 5, 2019 // 11:20 am to 12:20 pm // Howard Beach Resort Kenting, Taiwan	- Organized an IRN-specific panel for disseminate purposes
<u>1st IRN meeting</u> [in ICCE 2019] December 5, 2019 // 12:20 pm to 1:20 pm // Howard Beach Resort Kenting, Taiwan	- Initial IRN plans for collaboration synergy on funding application and publication preparation

IRN Year 1 Event 1: The external panel at CTE (International Conference on Computational Thinking Education) 2019 on June 12, 2019 was entitled “International Forum on Research, Practices and Policies on Computational Thinking Education in K-12”. The IRN Convener, the IRN Co-Convener, and three IRN Participants served as the panelists to deliver panel presentations for disseminating the overall vision of the IRN on computational thinking education. This panel was well-received by the conference participants.

IRN Year 1 Event 2: The external panel at ICCE (International Conference on Computers in Education) 2019 on December 5, 2019 was entitled “Assessments for Computational Thinking in Primary and Secondary Schools”. The IRN Convener, the IRN Co-Convener, and one IRN Participant served as the panelists to deliver panel presentations for disseminating the advocacy of the IRN on the assessment for computational thinking education. This panel was well-received by the conference participants.

IRN Year 1 Event 3: The first internal meeting at ICCE (International Conference on Computers in Education) 2019 on December 5, 2019 was chaired by the IRN Convener, with the presence of the IRN Co-Convener and three IRN Participants. The delegates mutually shared research experience and insights on the progress of computational thinking education in their own countries/regions. This first meeting led to initial plans of collaborative effort among IRN Participants in funding application and publication preparation.

(2) Accomplishment of IRN in Year 2 (17 April 2020 - 30 April 2021)

The IRN in Year 2 organized one academic conference, one forum, one workshop and one symposium for achieving the IRN-specific research initiatives.

<i>Year 2 Events</i>	<i>Outcomes</i>
<u>1st IRN-specific conference</u> [CTE 2020 (fully online conference)] August 19-21, 2020 // The Education University of Hong Kong, Hong Kong	- Organized the 1st IRN-specific conference
<u>1st IRN-specific forum</u> [in CTE 2020 (fully online conference)] August 20, 2020 // The Education University of Hong Kong, Hong Kong	- Organized the 1st IRN-specific forum for disseminate purposes
<u>1st IRN-specific workshop</u> [in CTE 2020 (fully online conference)] August 21, 2020 // The Education University of Hong Kong, Hong Kong	- Organized the 1st IRN-specific workshop for disseminate purposes
<u>1st IRN-specific symposium</u> [in ICCE 2020 (fully online conference)] November 24, 2020 // Asia-Pacific Society for Computers in Education (APSCE)	- Organized the 1st IRN-specific symposium for disseminate purposes

IRN Year 2 Event 1: The first IRN-specific conference – International Conference on Computational Thinking Education (CTE) – organized by the Education University of Hong Kong, Hong Kong – was held online in August 2020. Members in the IRN serve as the conference chair, international advisory committee members and international program committee chairs of CTE 2020. This conference helped the IRN linking with the CTE community, and also spreading research ideas and scale up scholarly endeavors of the IRN.

IRN Year 2 Event 2: The forum at CTE (International Conference on Computational Thinking Education) 2020 on August 20, 2020 was entitled “International Forum on Implementation of Computational Thinking Education in K-12”. The IRN Convener and one IRN Participant served as the panelists to deliver panel presentations for disseminating the overall vision of the IRN on implementing computational thinking education. This forum was well-received by the conference participants.

IRN Year 2 Event 3: The workshop at CTE (International Conference on Computational Thinking Education) 2020 on August 21, 2020 was entitled “Workshop on Learning Analytics for Supporting and Developing Computational Thinking Education”. The IRN Convener and two IRN Participants illustrated suggestions to bring learning analytics to schools to support and develop computational thinking education. This workshop was well-received by the conference participants.

IRN Year 2 Event 4: The symposium at ICCE (International Conference on Computers in Education) 2020 on November 24, 2020 was entitled “STEM for Problem Solving and Creativity Development”. The IRN Convener, the IRN Co-Convener, and two IRN Participants served as the panelists to deliver panel presentations for sharing ideas, experiences, and outcomes of STEM education for fostering students’ problem solving and creativity development. This symposium was well-received by the conference participants.

(3) Accomplishment of IRN in Year 3 (1 May 2021 - 30 April 2022)

The IRN in Year 3 organized one academic conference, one symposium and one workshop; as well as continued the preparation for publishing two books and organizing one academic conference for achieving the IRN-specific research initiatives on investigating and advocating the practice, research and policy conducive to the effective computational thinking education in primary and secondary schools.

<i>Year 3 Events</i>	<i>Outcomes</i>
<u>2nd IRN-specific conference</u> [CTE-STEM 2021] June 2-4, 2021 // National Institute of Education, Singapore	- Organized the 2nd IRN-specific conference CTE-STEM 2021
<u>2nd IRN-specific symposium</u> [in WERA Focal Meeting 2021 (fully online conference)] July 7, 2021 // World Education Research Association (WERA); Sociedad Espanola de Pedagogía; Universidad de Santiago de Compostela; and Red Transdisciplinar de Investigación Educativa	- Organized the 2nd IRN-specific symposium for disseminate purposes
<u>3rd IRN-specific panel</u> [in ICCE 2021 (fully online conference)] November 25, 2021 // Asia-Pacific Society for Computers in Education (APSCE)	- Organized the 3rd IRN-specific panel
<u>Publication: 1st IRN-specific academic book</u> To be published in May 2022 // Cambridge, MA: The MIT Press	- Continued the preparation for publishing the 1st IRN-specific academic book
<u>Preparation: 3rd IRN-specific conference</u> [CTE-STEM 2022 (hybrid mode of physical and online conference)] To be held on June 15-17, 2022 // Delft University of Technology, The Netherlands	- Continued the preparation for organizing the 3rd IRN-specific conference CTE-STEM 2022
<u>Publication: 2nd IRN-specific academic book</u> Planned to be published by December 2022 // The MIT Press	- Continued the preparation for publishing the 2nd IRN-specific academic book

IRN Year 3 Event 1: The second IRN-specific conference – International Conference on Computational Thinking and STEM Education (CTE-STEM) – was held at National Institute of Education, Singapore, on June 2-4, 2021. Members in the IRN served as the conference chair, international advisory committee members, international program committee chairs, and keynote speakers of CTE-STEM 2021. This conference helped the IRN linking with the CTE community, and also spreading research ideas and scale up scholarly endeavors of the IRN.

IRN Year 3 Event 2: The second IRN-specific symposium – “Learning Analytics for Supporting Computational Thinking Development” – was organized at WERA Focal Meeting 2021 on July 7, 2021. The IRN Convener and two IRN Participants discussed the approaches and resources for bringing learning analytics to schools to support and develop computational thinking education.

IRN Year 3 Event 3: The third IRN-specific panel – “The Role of Artificial Intelligence in STEM Education” – was organized at ICCE (International Conference on Computers in Education) 2021 on November 25, 2021. The IRN Convener and three IRN Participants shared the experiences, practices and challenges of computational thinking education through artificial intelligence for STEM development from an international perspective.

IRN Year 3 Event 4: The IRN continued preparing the publication of the 1st IRN-specific academic book “Computational Thinking Education in K-12: Artificial Intelligence Literacy and Physical Computing”, which is scheduled to be published by MIT Press in May 2022.

IRN Year 3 Event 5: The IRN continued preparing the organization of the 3rd IRN-specific conference International Conference on Computational Thinking and STEM Education (CTE-STEM) 2022 – to be held at Delft University of Technology, The Netherlands, on June 15-17, 2022. Members in the IRN serve as the conference chair, international advisory committee members, and international program committee chairs of CTE-STEM 2022. This conference can help the IRN linking with the CTE community, and also spreading research ideas and scale up scholarly endeavors of the IRN.

IRN Year 3 Event 6: The IRN completed the chapter-manuscripts submission for publishing the 2nd IRN-specific academic book “Computational Thinking Curricula in K-12: International Implementations”, which is planned to be published by MIT Press in December 2022. The IRN continued working with the publisher for the book production.