Coding for Community Project: Building a diversified coding community in Hong Kong secondary education

「編」、「社」人生計劃：建構多樣化的香港中學編程教育及學習社群

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Summary of the Impact

- The findings from a three-year longitudinal project (2016 – 2019) in Hong Kong revealed the importance of collaboration in computational thinking education, and benefits of developing other skills beyond computational thinking as early as in primary schools. Yet, very minimal knowledge is known about how to foster pedagogical practice in secondary schools for computational thinking education beyond the classroom walls.

- **Coding for Community (C4C) Project** was launched in 2019 during COVID-19, as a research-based knowledge exchange programme, to develop a community-based design of computational learning, that emphasizes the learning in classroom, building a culture of collaborative knowledge building among students, and enhancing collaboration with mentors to serve the community and build better psychosocial wellbeing.
Underpinning Research

- **Project title:** The impact of coding education in Hong Kong primary schools: a longitudinal study
- **Nature of project:** a three-year multi-case longitudinal research
- **Project goal:** to examine the impact of students’ computational thinking through coding education in schools, and how students can develop computational thinking across ages and be motivated to serve the needs in our society
- **Grand challenges addressed and highlighted:**
  - the importance of developing **computational thinking and other skills** (cognitive or psychosocial) in the process;
  - the awareness of **developmental aspects** of computational thinking across different ages; and
  - the roles of **collaborative** versus individual problem-solving in the processing of solving computational problems and developing computational thinking.
Underpinning Research

• When conducted?
  – **Pilot study:** Before Jan 2017 [Survey study with 9300+ students]
  – **Main study:** Jan 2017 to Dec 2019 [Theoretical and empirical study with 700+ students]

• Who are involved and their roles:
  – **PI:** Gary WONG (HKU)
  – **Co-Is:**
    • William COPE (U of Illinois at Urbana Champaign)
    • George REESE (U of Illinois at Urbana Champaign)
    • Ivan KALAS (UCL)
    • Chun Kit CHUI (HKU, Dept of Computer Science)
    • Cher Ping LIM (EdUHK)
    • Tak Lam WONG (EdUHK)
    • Hin Leung CHUI (EdUHK)
Underpinning Research

We have discovered the interrelationship between computational thinking and other skills, developing through ages and collaboration.

Exploring children’s perceptions of developing twenty-first century skills through computational thinking and programming

Gary Ka-Wai Wong and Ho-Yin Cheung

Faculty of Education, The University of Hong Kong, Pokfulam, Hong Kong, People’s Republic of China

Collaborative versus individual problem solving in computational thinking through programming: A meta-analysis

Xiaoyan Lai and Gary Ka-wai Wong

Abstract

Computational thinking (CT), which is a cognitive skill used to solve problems with computational solutions,
Computational thinking is developed through different ages.

Computational thinking is a multifaceted skill across different domains that support the development of other skills.

Advanced our understanding constructionism learning theory and social-constructivism theory in practices.


The research reveals a potential of advancing computational thinking education to interdisciplinary approach, in higher age groups, to impact future technologies in society, e.g. AI, and collaborate with others for positive psychosocial wellbeing.
Engagement

• Previous research findings were disseminated through various means, such as press media interview, educational events for public seminars and talks, and workshops at EDB between 2016 and 2019.

• Knowing the needs of developing new curriculum and pedagogical practices based on the findings for secondary schools, the recruitment process of external partners such as local institutes and NGO, and resources began in Jan 2019 to develop a project to engage schools into the evidence-based intervention to inform the future policy of computational thinking education.

• Jockey Club Coding for Community Project (C4C Project) was developed and funded by the Hong Kong Jockey Club Charities Trust with HK$11,370,000.00, in collaborating and exploring a possible extension of CoolThink@JC project to secondary schools (one of the largest scale of KE project in promoting coding education in primary schools).

• Based on the pre-mature project, Project C, initiated by Youth Global Network (YGN), C4C Project extended the legacy of Project C in collaboration with CITE and Department of Applied Social Sciences at PolyU to revamp the current ICT curriculum.

• The collaboration team discussed with existing research findings as well as seeking other recommendations from different stakeholders such as school principals, teachers, educators, and policymakers to develop the project plan.

• During the discussions, youth development and engagement were highlighted as a part of the theme to develop a holistic and equitable computational thinking education in secondary schools.
Engagement

Organized by

Funded by

Co-organized by
Engagement

(Innovativeness of the engagement approach)

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<td>Kick-off Cohort 1 (F.3) and Cohort 2 (F.2) (3+4 schools)</td>
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School invitation and recruitment
Kick-off Cohort 1 (F.2) (3 schools)
Kick-off Cohort 2 (F.3) (4 schools)

Impacts Achieved (Curriculum)

- **Invent** a new community-based pedagogical practice for changing the computational thinking education
- Adopted by **22 secondary schools**, serving more than **4,000 students** (including those that were not funded by the project grant), with nearly **100 teachers** along with **700 trained mentors** supporting the students’ computational learning and community projects
Impacts Achieved (Curriculum)

- **Unit 1: Visual Programming Basics**
  - Use **unplugged activities**, games and exercises on the computer to learn computational thinking concepts, events, commands, loops, functions, conditionals, variables, etc.

- **Unit 2: Mobile App Development**
- **Unit 3: Advanced Mobile App Development & Database**
  - Students will learn how to use youCodia to build a database for their apps. They will also learn about how to improve user experience for their apps.
Impacts Achieved (Community-based pedagogical practice)

- Funding supported 7 schools since September 2019, benefiting nearly over 2,000 students, entirely during the unprecedented COVID-19 epidemic.
- Around 36 teachers were involved in the delivery of 31 compulsory lessons with 17 elective lessons (nearly 60 contact hours per student) in physical or remote classroom, with nearly 300 mentors participating in over 150 hours of meeting with the students in community.
Impacts Achieved (youCodia)

The extension work of youCodia has been funded for further development (July 2020 – June 2023) with nearly HK$4 million by Innovation and Technology Fund.
Impacts Achieved (Talks and Events)

- Engaged students physically and remotely during COVID-19
- Involved teachers and mentors to help students explore the community issues and build apps to address those issues.
- Enhance students’ psychosocial wellbeing
Impacts Achieved (Documentary Video)

A set of professional documentary videos were produced to promote the community-based pedagogical practices for computational thinking education:

1. Project Introduction [6:06]
2. Documentary Video on Teachers [1:48]
3. Documentary Video on Students [1:40]
4. Documentary Video on Mentors [1:35]
5. Highlight of Coding Competition [7:28]

Dissemination plan: Post to various social media such as Facebook, Instagram, Twitter, LinkedIn and YouTube to further populate the impacts of the project.
Impacts Achieved (Knowledge Exchange Activities)

• Pioneered various impactful activities for setting future policy
  – Serving on the Curriculum Development Council (Technology Education) to revamp the existing technology education curriculum framework
  – Trained near 200 teachers who have received more than 500 hours of professional development to empower their pedagogical competences
Impacts Achieved (Knowledge Exchange Activities)

- Co-founded a mentorship scheme and trained those 300 mentors to collaborate with students’ coding projects.
- Supported students with more than 150 hours in mentoring meetings of collaborative knowledge building.
Impacts Achieved (Psychosocial Wellbeing)

- Students had a **positive psychosocial growth** (i.e., coding attitude, self-efficacy, grit, sense of community, sense of belonging, intrinsic motivation of learning) throughout this project.
- The difference of the growth between **the underprivileged students** (e.g. from low-income family) and other students was **less divided**.
- Those students who were supported by **mentoring** had **significant higher growth** in their psychosocial development.