

Campus Futures: Co-creating with Social Innovation

Design Scientists Incubation Program

Youth explores **climate equity** in high-density urban design
through **biomimicry knowledge** and **biodegradable materials**.

特別鳴謝
Special thanks



Overview

In Hong Kong's typhoon-prone zones, where heavy rains scour granite badlands, youth become Nature's Architect through this 3-months workshop blending biomimicry design with Nature based Solutions (NbS). Participants mimic nature's resilient strategies to prototype urban design strategy (like interlocking mangrove roots as flood barriers). Hands-on experiments integrate AI skills with STEM, fostering research mindset aligned with sustainable development goals (SDG).

Structure:

- **PERIOD & VENUE:** MAR-JUN 2026, CUHK.
- **CLASSES:** 9 classes (3 Phases x 3 weeks x 3 hours = 27 hours).
- **YOUTH:** 24 participants (ages 14-24, work in groups of 4).
- **TUTORS:** Each team works with a professional mentor and a Teaching Support Leader (TSL).
- **TIME:** Learners are required to complete homeworks, tutors might offer additional virtual mentoring.

Learning Objectives:

1. **Biology:** Learn to use biomimicry (design inspired by nature) to create solution.
2. **Design + Tech:** Learn rapid prototyping design with GenAI tools.
3. **Geography:** Map your context and climate problem.
4. **Community Review:** Final exhibition.

Output:

- **Design Portfolio** for university application.
- **Physical Prototype** with 3D print and biodegradable material.
- **Exhibition** to showcase outcome.

Website & Signup: <https://provides-ism.com/citizenscientist>



Syllabus

PHASE 1: RESEARCH

Week 1 (8MAR) Nature based Solution (NbS) & Biomimicry Design

Week 2 (15MAR) Site Visit to Sai Sha (tbc)

Week 3 (22MAR) Generative AI & Speculative Design

Output: each team present 6 research slides to mentors

PHASE 2: DESIGN

Week 4 (5APR) Design Solution Sprint

Week 5 (12APR) Scenario Design & Foresight

Week 6 (19APR) 3D Printing

Output: each team present 12 design slides to mentors

PHASE 3: SHOW & TELL

Week 7 (3MAY) Final Sprint & Submission

Week 8 (10MAY) Rehearsal & Prep

Week 9 (17MAY) Final Review & Community Exhibition & Award Ceremony

Output: each team present 16 slides + 1 physical prototype to guest critics

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Additional Benefits:

- STEM in ESG and Design+Tech Certificate.
- Recommendation letter (upon request).
- Competition Awards and commendations.

Portfolio:

AI in Eco Design: <https://provides-ism.com/rear>

Biodegradable Design: <https://provides-ism.com/computational-biophilia>

Climate equity

in education is about

who is most exposed to

climate risks

(heat, air pollution, flooding)

and who gets access to

protection, resilience investments,

and climate learning opportunities.

School Exposure Disparities:
Private schools has Up to
10x more greenery
than public schools

(Institute of Health Equity, 2024)

Home Environment Impacts:
Subdivided Flats average
temperature is 40% higher
than private housing (up to
39.9°C).

(SCMP, 2025)

Education and Awareness Gaps
Lower income youth score 3.62
on environmental attitudes,
while their higher income
counterpart scores
2% higher

(HKBU, 2016)

How can we learn from nature to enhance climate equity? 我們如何向大自然學習以促進氣候公平？

Three gaps

1. **Nature**: subjects are frequently taught in silos, disconnected from the interdisciplinary problems of real world climatic challenges.
2. **Human**: Students lack empowering pathways to develop and test tangible solutions, often leading to apathy, anxiety, and disengagement.
3. **Environment**: School grounds are often seen as static spaces, not as active sites for experimentation.

Three objectives

1. To support schools in operationalizing applied STEM education with a flagship, cross-curricular project, integrate:
 - **Biology** (ecosystems, microorganisms),
 - **Design & Technology** (CAD, digital fabrication), and
 - **Geography** (urban environment, sustainability).
2. To evaluate effectiveness of **project-based learning (PBL)** pedagogies in nurturing a next generation of leaders through **ESG in STEM** curricular.
3. To identify **volatile spaces in school campus / district** that are increasingly affected by rising temperatures, and might undermine youth's time to play, exercise, and socialise.



水浸黑点官坑村落雨 变汪洋



Kwun Hang turned into a vast expanse of water after the rain.

Target Site

Nai Chung Pebbles Beach
泥涌石灘



Tseng Tau Pier
井頭碼頭



Three Fathoms Cove



Nin Wah Rd
SYMPHONY BAY
Sa 帝琴灣

NAI CHUNG
泥涌
Sai Sha Rd

SAI O
西澳

GO PARK Aqua

UNG
TAU
木頭

GO PARK Sai Sha



TSENG TAU
TSUEN
井頭村

Three Fathoms Cove
企嶼下海

KWUN HANG
官坑

TAI TUNG
TSUEN
大洞村

Wu Chau
烏洲

NGA YIU
TAU TSUEN
瓦窰頭村

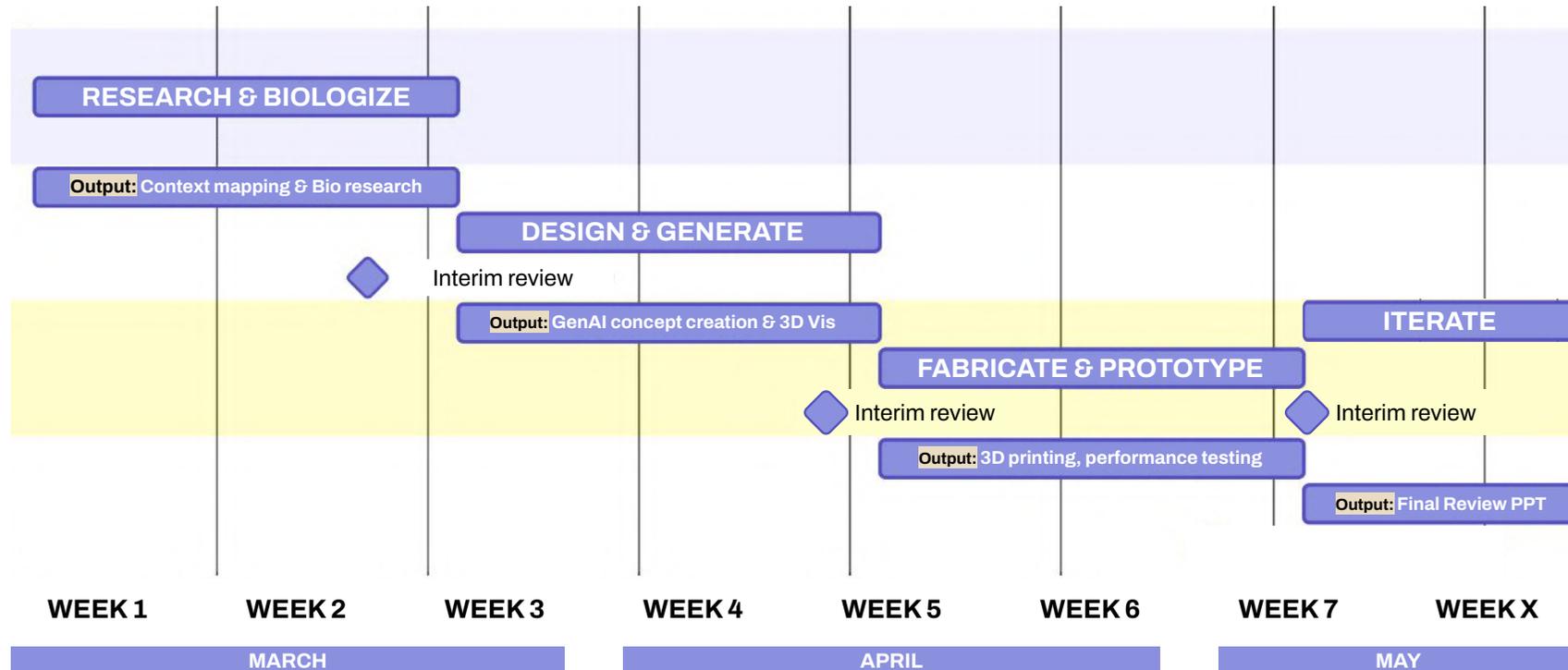
TAI TUNG
WO LIU
大洞禾寮

SAI KENG
西徑村

Yung Shue O Jetties
榕樹澳漁排碼頭佰級梯



Timeline



Goals for each stage

WEEK 1.
Understand flooding as a land/water interface design problem



WEEK 2.
Biomimicry = learn from nature



WEEK 3.
develop prototype as test kit to recover nature-culture bond



WEEK 4.
Design nature-based solution



WEEK 5.
Use AI to prototype 3D model



WEEK 6.
3D print



Idea Example

Rooting structure
guided by
biodegradable
material to help relieve
soil erosion.



Interlay artificial and
natural structure to
reinforce steep hills while
promoting vegetation
growth.



Flood resilient
structure that helps
ocean creature to
rehabitat the area
(e.g. oyster that can
help clean water).



Takeaways 4 Students

3 Tangible

- **Portfolio** for university application.
- **Prototype** with 3D print and biodegradable material.
- **Exhibition** to showcase outcome.

3 Intangible

- **Skills** integration: TECH, STEM, soft skills + design thinking.
- **Competition** experience: chance to win a STEM+Design award!
- **Network** from our Star Speakers and licensed professionals to diversify career insight.



Mentors & Judges

RESEARCH MENTORS



Dr. Felix Leung

Environmental Scientist



Provides Ng

Lecturer, digital designer, PhD researcher.



Elizaveta DORRER

PhD, Architect, Analyst



Tifa

Architect, educator, PhD researcher.

PROFESSIONAL ARCHITECT & DESIGN MENTORS



Esther Chan

Registered Architect
(ARB, HKIA)



Larissa Leung

Registered Architect.



Carson Leung

UK registered architect and researcher



Tracy Wong

Social Communication Practitioner | Design Strategist |

STAR GUEST MENTORS



Prof. Leung Wing Mo

Prof. Leung Wing Mo is the Former Assistant Director of the Hong Kong Observatory; Adjunct professor at the Physics Department of CUHK; and the Chairman of the Guangdong Nuclear Safety Consultative Committee. Prof. Leung is the first professional meteorologist in Hong Kong to host TV weather programmes, including the



Prof. Wong Kam Sing

KS was the Secretary for the Environment of Hong Kong SAR Government in '12-22. During his ten-year tenure as the "environment minister", KS initiated various sustainability policy blueprints, leading HK towards carbon neutrality before 2050. In 2024, KS published the book Hong Kong Stories in the Journey towards Carbon Neutrality. KS has



Dr Wendy LEE Woon Ming

Dr Wendy Lee brings extensive management expertise and a proven track record in the development and application of cross-regional innovative technologies, promoting digital education, nurturing talent, and improving technology accessibility. Committed to fostering the integration of technology with industry, Dr Lee is the

GUEST INSTRUCTOR



Nabi Agzamov

PhD Researcher, Architect, GIS Digital Cartographer



Jing Chang

Architect, Computational Designer



Yaoyao Meng

Robotics Specialist & Material Research



Carlos Rivera Salaverry

Advanced Digital Designer, Architect.



Weihao Yin

Architect, Engineer, Researcher





Digital Common(s)
數碼共同體

Real World Impact

- 3 years
- 150+ citizens
- 15+ prototypes
- 21 partnerships



www.provides-ism.com



香港青年協會
The Hongkong Federation of Youth Groups
黃鳳會之明青年空間
Yellow Club for Ment Youth S.P.O.T.

LCARE Centre 耆樂老人服務中心
for Whole-person Development

BGCA
百康小平靜益壽

DESIGNTRUST
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AN AFFILIATE OF THE
DESIGN COUNCIL OF HONG KONG

延齡與香港協會
沙田多元化金齡服務中心
ELCHK, Shatin District Community Centre
for the Golden-Aged

Community Pilots

Urban Living Lab with AI
BGCA Partnership
2025

Metaverse Co-creation
HKFYG Partnership
2022-present

Citizen Scientist Program
HK-SZ UABB Partnership
2022 & 2025



School of Architecture
THE CHINESE UNIVERSITY OF HONG KONG

UCI
THE BARTLETT

CUHK
THE UNIVERSITY OF HONG KONG
CUHK ARCHITECTURE
香港中文大學建築學系

香港建築師學會
The Hong Kong Institute of Architects

Professional Upskill

Architect AI Upskilling
HKIA Partnership
2025

AI-enhanced learning
CUHK Medicine
2023

Workshop & Certification
Soft Culture Partnership
2023-present



微創工場
PhaBuilder

CRCA

SEMS
專業服務 專業服務
SEN SERVICE

MedPHA 表得發

Auto Production

Community Micro-factory
Design Trust Partnership
2024

Urban Mining 2.0
Global Science Summit,
Berlin 2025

Biodegradable Design
MedPHA Partnership
2025-2026

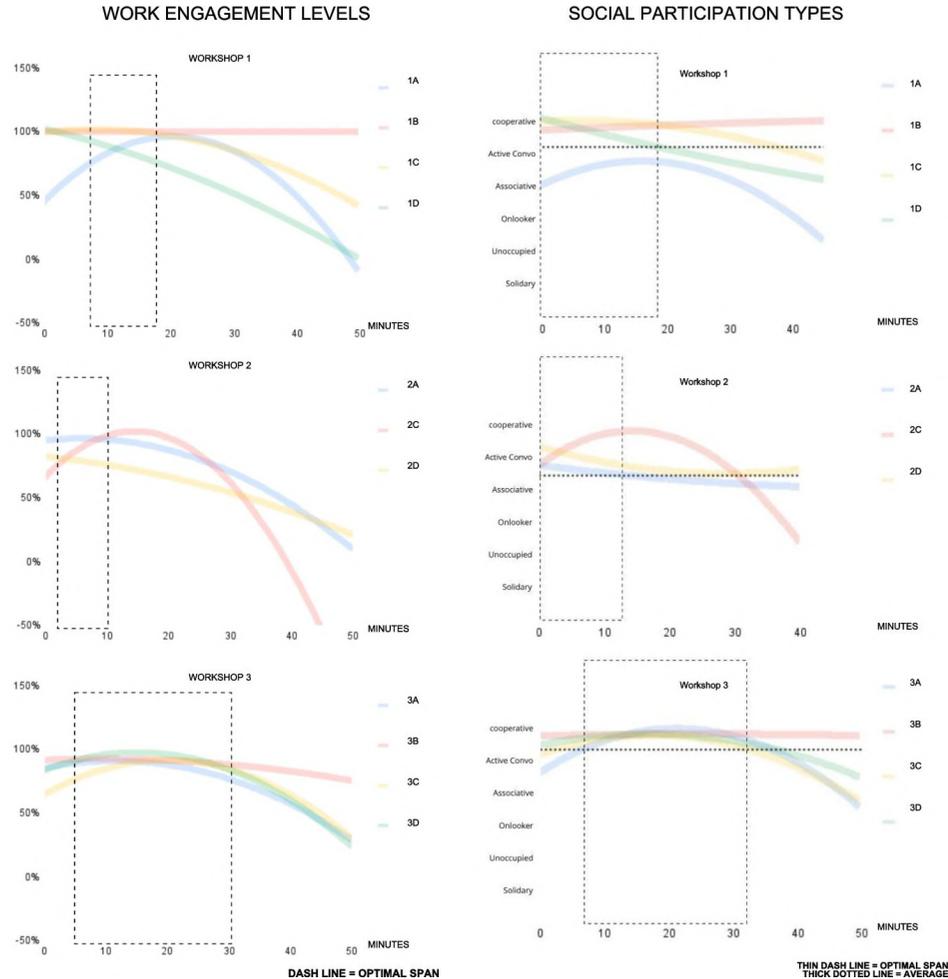


GenAI Integration

Data & Validation

Engagement and motivation increased by 34-40%.

- + Intergenerational cooperation and co-creation in public space design assisted by Virtual Reality (VR) environments. Journal: Architectural Intelligence. Publisher: Springer Nature. Provides Ng, Shutong Zhu, Yuechun Li, and Jeroen van Ameijde. (2024). <https://doi.org/10.1007/s44223-024-00080-1>
- + Digitally-Gamified Co-Creation: Enhancing Community Engagement in Urban Design through a Participant-centric Framework. Journal: Design Science. Publisher: Cambridge University Press. Provides Ng, Shutong Zhu, Yuechun Li, and Jeroen van Ameijde. (2024). <https://doi.org/10.1017/dsj.2024.17>
- + Challenges and Opportunities of Using Metaverse Tools for Participatory Architectural Design Processes. Journal: Virtual Worlds (Vol. 3. No. 3, pp. 283-302). Publisher: MDPI. Ng, P., Eloy, S., Raposo, M., González, A. F., da Silva, N. P., Figueiredo, M., & Zuberi, H. (2024, July). <https://doi.org/10.3390/virtualworlds3030015>
- + Digital common(s): the role of digital gamification in participatory design for the planning of high-density housing estates. Journal: Frontiers in Virtual Reality. Publisher: Frontiersin. Provides Ng, Yuechun Li, Shutong Zhu, Bingge Xu and Jeroen van Ameijde. (2023). <https://doi.org/10.3389/frvir.2022.1062336>



Intergenerational cooperation and co-creation in public space design assisted by Virtual Reality (VR) environments

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Provides Ng, Shutong Zhu, ... Jeroen van Ameijde Show authors

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Abstract

The world's ageing population presents both challenges and new opportunities for urban design, particularly in high-density cities like Hong Kong. This study investigates intergenerational cooperation in the co-design of urban public spaces, assisted by Virtual Reality (VR) environments. Through a series of workshops inviting youth, university students, middle-aged adults, and older residents to work in small teams, we documented their interactive behaviours and observed how the involvement of different age groups may influence the cooperative process and design outcomes, especially when VR tools were involved. Our findings shed light on several key aspects. First, how work engagement levels differ based on highly-, moderately-, and non- intergenerational groups. Second, observable patterns of common task-role distribution between age groups within a self-organised collaborative process. Thirdly, the various types of social participation, from cooperative, associative to solitary, emerged as a consequence of such interactions. Finally, from the co-created public space designs, any transformational and transactional values that arise were discussed. The study contributes to ways in facilitating more age-friendly approaches in urban design, especially in face of digital transition, and highlights the importance of intergenerational cooperation in design processes so as to create more inclusive environments.



參加者感言



經過呢次活動之後，本人覺得雖然我們做的合作能力不是最好的。而且中間亦科技或是溝通上發生了很多小問題，但是我都無法忘記我們合作時和獲益良多的經歷。

—— Tokiwa



我在活動中了解到自己對設計建築的興趣。但對我而言，設計時了解用家意見時的說話技巧是最有用。我們很多時候關心別人會著重於他們當中的情況，而忽略了他們的感受，因此無意中傷害了他們。



此外，我在活動中真正體驗到長者們退休前的工作經驗為我們帶來的各種有用意見，讓我見識到我從前當義工服務長者看不到的情況，令我對長者產生從心而發的敬佩。

— 子蕪



地球本一家
膚色無分差
人人都要愛
關心暖萬家

— Bingbing



通過是次活動，讓我感受到同齡組別，及不同齡組別的特性。透過超過數十小時的溝通，更得到意想不到的結果。這是我在2024年的收穫！

— Mingming



“Ultimately, we are not just serving a user group; we are building our own future. We will be the leaders of tomorrow. This is not a passion we have; it’s our responsibility. We hope you can join us to create this future where we would happily live greener, together.”

Special Thanks

We are very grateful to the support provided by all of our funders, sponsors, and partners. Most importantly, we thank all our participants, without whom, this project would not have been possible.