

2022 Environmental Education International Workshop  
Environmental Management for Sustainable Cities

# Practical Experience of Maker-Centered Curriculum Development on Eco-Campus

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# School Introduction

- Dashan Elementary School, Miaoli County
  - ◆ Class: 6+1 (preschool)
  - ◆ Student: 104
  - ◆ Staff: 21

# School Location

## ■ Close to the Taiwan Strait



# School Location

- Located in Houlong Township, Miaoli County



# Localized Curriculum

- Local agricultural production:
  - ◆ Rice, watermelon, pumpkin, sweet potato, peanut, etc.
- Courses on “Sustainable Food” pathway
  - ◆ Rice cultivating, watermelon growing, chicken breeding, organic vegetable growing, etc.

Video

# School-based Curriculum

YouTube

- Close to the largest offshore wind farms in Taiwan
  - ◆ Renewable Energy
  - ◆ An important issue for sustainable development.
- Courses on “Energy” and “Climate Change” pathways
  - ◆ Making renewable energy toy cars.

# Curriculum Development for Sustainability

## ■ Local natural resources:

- ◆ Broad fields and forests
- ◆ Vital ocean and wetlands

## ■ School visions:

- ◆ to learn happily
- ◆ to stand locally
- ◆ to view internationally

# Curriculum Development Philosophy

## ■ Dewey's constructivism :

- ◆ Learning by constructing knowledge through the act of making something shareable (Martinez, & Stager, 2013, p.21)
- ◆ Maker-Centered learning.

## ■ Learning performance:

- ◆ Implementing sustainable actions for community.



# Curriculum Development for ESD

- Supports from Taiwan-US Eco-Campus Partnership Program of EPA
- Accredited Honors:
  - ◆ Bronze Award ( September 26, 2016 )
  - ◆ Silver Award ( October 17, 2017 )
  - ◆ Green Flag ( December 11, 2018 )
  - ◆ Green Flag ( R1, December 2, 2020 )
  - ◆ Green Flag ( R2, June 13, 2022 )

We **NEED** to Change!

# New-generation Environmental Education Development in Taiwan

The central graphic is a circular diagram with 17 segments, each representing a Sustainable Development Goal (SDG). The segments are arranged in a circle around the central text "Full STEAM Ahead". The segments are numbered 1 through 17, with their corresponding icons and Chinese descriptions:

- 1: 消除貧窮 (Eradicate Poverty)
- 2: 消除飢餓 (Zero Hunger)
- 3: 良好健康與福祉 (Good Health and Well-being)
- 4: 優質教育 (Quality Education)
- 5: 性別平等 (Gender Equality)
- 6: 潔淨的水與衛生 (Clean Water and Sanitation)
- 7: 可負擔的潔淨能源 (Affordable and Clean Energy)
- 8: 尊重就業與經濟發展 (Decent Work and Economic Growth)
- 9: 產業創新與基礎設施 (Industry, Innovation and Infrastructure)
- 10: 減少不平等 (Reduced Inequalities)
- 11: 永續城市與社區 (Sustainable Cities and Communities)
- 12: 負責任的消費與生產 (Responsible Consumption and Production)
- 13: 氣候行動 (Climate Action)
- 14: 水下生命 (Life Below Water)
- 15: 陸地生命 (Life on Land)
- 16: 和平正義與有力的制度 (Peace, Justice and Strong Institutions)
- 17: 夥伴關係 (Partnerships for Goals)

Surrounding the central diagram are several photographs illustrating environmental education activities:

- Top left: A student in a yellow shirt works on a craft project, possibly a paper boat or a model, in a classroom setting.
- Top right: Several wooden houses with colorful patterns on their roofs are displayed on a table.
- Middle left: A young boy in a grey sweater holds a small green seedling in his hands, smiling.
- Middle right: A large, colorful drawing of a tree with various insects and animals is being worked on by a group of students.
- Bottom left: A student is working on a wooden structure, possibly a model or a craft project, on a green cutting mat.
- Bottom right: A group of students are engaged in an outdoor activity, possibly a field study or a practical exercise, in a natural setting.

# Instance 1: Making Leopard Cat Models

- Leopard cat (LC) :
  - ◆ The first-level endangered protected animal in Taiwan.
- Curriculum context:
  - ◆ The distribution of the LC in Miaoli County is the largest in Taiwan.
  - ◆ The distribution of the LC in Houlong Township is the largest in Miaoli County.

# Instance 1: Making Leopard Cat Models

## ■ Objective:

- ◆ To cultivate children's responsibilities for preserving local leopard cats.

## ■ Learning tasks:

- ◆ To explore LC's life and crises through scientific reading.
- ◆ To design and make LC models from recycled newspapers.

# Instance 1: Making Leopard Cat Models

- Process of making leopard cat models:
  - 1) Kneading recycled newspapers into small balls.
  - 2) Combining paper balls to shape the LC's figure.
  - 3) Sticking white paper on the LC model's surface.
  - 4) Coloring the model with paints.

# Instance 1: Making Leopard Cat Models

## ■ Effects:

[YouTube](#)

- ◆ Students making LC models from recycled newspapers executed the act of plastic reduction.
- ◆ Students did concern both leopard cats and the forest biodiversity of “Satoyama” near Dashan Elementary School.

# Achievements of Making Leopard Cat Models

■ Maker-centered curriculum practiced :

◆ Two environmental Pathways:

➤ Biodiversity, Consumption and Waste

◆ 2030 Agenda SDGs:

➤ Goal 4, Goal 15



CONSUMPTION  
& WASTE



BIODIVERSITY

## Instance 2: Building Bee-friendly Habitats

### ■ Pollinators:

- ◆ Bees and wasps, are vital to the maintenance of both wild plants and agricultural productivity.

### ■ Curriculum context:

- ◆ Honeybee Colony Collapse Disorder (CCD) has occurred in the US, Europe, and China since 2006 due to:
  - habitat fragmentation
  - monoculture crops
  - pesticides
  - parasitic mites
  - climate change
  - interactions between those above



## Instance 2: Building Bee-friendly Habitats

### ■ Curriculum context:

- ◆ Wild bees can be backup for pollinating flowers and vegetables.

### ■ Objective:

- ◆ To involve students in building bee-friendly habitats for their community.

### ■ Learning tasks:

- ◆ To avoid using pesticides on campus.
- ◆ To grow nectar plants widely.
- ◆ To provide some materials with tunnels for female bees to breed, such as making solitary bee hotels.

## Instance 2: Building Bee-friendly Habitats

### ■ Process of making solitary bee hotels:

- 1) Designing a small cabin and counting the materials.
- 2) Measuring and sawing the boards.
- 3) Drilling and combining the boards with screws.
- 4) Drawing on the cabin and painting it.
- 5) Making breeding tunnels:
  - a) using the drill press to drill holes in the board.
  - b) using the router to dig a long groove in the board.
  - c) covering the boards with transparent films to assist students in observing the bee larvae growing.

## Instance 2: Building Bee-friendly Habitats

- Sustainable action for community:

- ◆ Some hotels were hung on campus, and the others were hung in the Wanbao community next to the school.

- Effects:

- ◆ Solitary bee hotels attracted bees/wasps coming to breed, which helped pollination and removal of caterpillars from vegetables.

# Instance 2: Building Bee-friendly Habitats

## ■ Achievements:

### ◆ Eco-Campus Pathways:

➤ Biodiversity, School Habitat, Sustainable Food

### ◆ 2030 Agenda SDGs:

➤ Goal 2, Goal 12, Goal 15



BIODIVERSITY



SCHOOLYARD  
HABITATS®



SUSTAINABLE  
FOOD

# Conclusion

- Integrated Maker-Centered Curriculum:
  - ◆ Achieving environmental pathways, 2030 SDGs, and implementing “learning by doing” philosophy.
- Implementing sustainable actions for their community:
  - ◆ Attaining UNESCO’s “Pillars of Learning” as below:
    - learning to know
    - learning to live together
    - learning to do
    - learning to change

# More Experiences about Eco-Campus

■ Read the Blog for more instances

◆ <https://ecodashan.blogspot.com/>



大山腳  
苗栗縣後龍鎮大山國民小學 校長室

2022年5月19日 星期四

海洋科技教育—自造獨木舟 ( 6 )

5/19(四)覆蓋玻璃纖維與塗抹環氧樹脂

早晨踏入三樓活動教室，除了開心之外，還有滿滿的感動！大山國小的孩子就這樣以徒手製作完成了3艘獨木舟，真的太厲害了！經過一個晚上的靜置，三艘獨木舟的彩繪已經乾燥，今日的進度是進行防水處理，在此之前，大夥已迫不及待地要與獨木舟合影留念。

大山園丁

- 校長(Principal)
- 理念(Philosophy)
- 經歷(Experience)
- 專業(Achievements)
- 研發(Creations)
- 榮譽榜(honor)
- 最新文章(Article)

文章類別

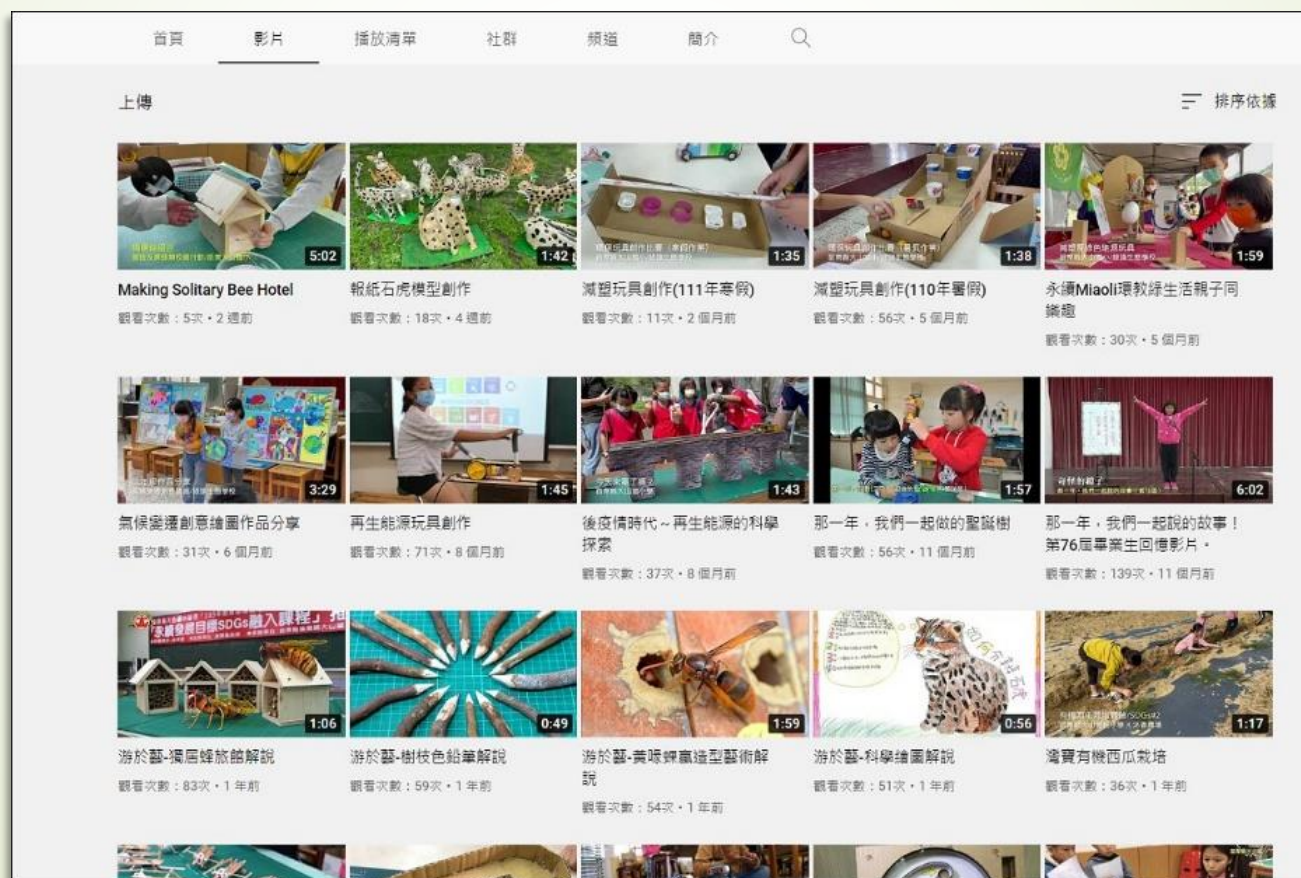
- 公開授課 (13)
- 戶外教育 (24)
- 幼兒教育 (4)
- 永續食物 (29)
- 生物多樣性 (32)



# More Experiences about Eco-Campus

■ Watch documentary videos for more details

◆ <https://www.youtube.com/user/daddyof3kids/videos>



# Acknowledgement

- Thank you all for your time and attention!
- Thanks to GEEP (APRC) for providing sharing opportunity!
- Thanks to my colleagues for the curriculum design and implementation!