

# STEM 03 - Water

## Project introduction

### Objectives

1. To acquire the concepts in biology, specifically water absorption in plants though building self-watering system
2. To activate students' creativities and interests in STEM through activities and discussion

**Supervisor:** Dr Yip, Wing Yan Valerie

**Community Partner:** Hong Kong New Generation Cultural Association

**Workshop Date:** May 22, 29

CUHK -PGDE	HKU - BEd&BSc, PGDE	HKU - BSc
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## STEM Workshop



### Science

- Understanding the mechanism of water uptake of plant



### Technology

- Measuring the effects of the self- watering system scientifically by sensor



### Engineering

- Constructing the water pipes system



### Mathematics

- Understanding combinations of water pipes with different shapes

## Workshop Design Rationale

### Day 1- Building a self-watering system

#### Learning objectives:

##### Knowledge

1. describe the process of water absorption in plants and explain by using the process of photosynthesis
2. explain the working principle of the self-watering setup

##### Skills

1. construct a reliable self-watering setup for plants under some restriction with creativity
2. communicate and collaborate with groupmates to accomplish the tasks



#### Design

A 60-minute workshop includes

- lecturing the condition of photosynthesis in plants;
- demonstrating how to make the self-watering system;
- hands-on session of making their creative and effective self-watering system

### Day 2 - Evaluating and Modifying watering system

#### Learning objectives:

##### Knowledge

1. explain the working principle of the self-watering setup

##### Skills

1. communicate and collaborate with groupmates to accomplish the tasks
2. develop problem-solving skills
3. present their design rationales clearly
4. evaluate the self-watering systems

##### Values

1. appreciate the work constructed by classmates
2. appreciate the work of scientists and engineer

#### Design

A 60-minute workshop includes

- guiding students to evaluate on their systems by analyzing the direction of water current;
- hands-on session of modifying their self-watering systems;
- evaluating the effectiveness of system objectively by soil moisture sensor;
- class discussion on the effectiveness of different designs of systems

## Project Highlights

- **Upcycling of unwanted wastes**, such as plastic bottles and mop, in the design of self-watering system
- Application of self-watering system in **daily life scenario**
- **Creativity and hands-on experience** are included during building the self-watering system

## Conclusion and Recommendations

We have achieved our ultimate goals and successfully built the self-watering system with the students and filled with a joyful and fruitful experience. We wish to express our heartfelt gratitude and sincere appreciation to our supervisor and the community partner for providing us the valuable opportunity and their genuine support. It is suggested to run more trials in building and testing the self-watering system model before the workshop to foresee more possible models that could be built by the students.

## Limitation and Difficulties

**Limitation:** At the current stage, we only have time to plant the seed with students. However, it is a pity that we cannot monitor the growth of the plants so to investigate the feasibility of using the self-watering system in long run.

**Difficulties:** As we didn't have any experience in running hands-on workshop with primary school students before, it was hard for us to estimate the time needed for each task and the ability of students. There was also contingency at the on-day when students needed to perform group work (i.e. a student isolated himself from others).

## Individual Reflections

We gained knowledge related to plant and watering system from this project. Regular watering can be a challenging task for busy citizens in such a bustling city like Hong Kong, as well as for frequent, short-term travellers. Self-watering system can thus be an efficient way to water plants regularly with little efforts. Designing and producing self-watering system for plants allow students to acquire different STEM knowledge

We put emphasis on technology and scientific inquiry. Though our project lacks solid engineering elements, we incorporated the hands-on experiences as much as possible, that the students may have never tried before. There was an orderly cooperation and division of labour between team members, which made the project go smoothly.

## Acknowledgement

We would like to express our greatest gratitude to Dr. Jimmy Wong and Dr. Rick Cheung, as well as Hong Kong New Generation Cultural Association, who gave us the golden opportunity to hold the two-day STEM workshops in a primary school setting.

We would also like to thank Dr. Valerie Yip who had provided a lot of guidance and suggestions on our project during preparation stage.