

**Federation for Self-financing Tertiary Education (FSTE)  
Small Research Grant Scheme (SRGS)**

**Final Report**

This form should be completed by the Principal Investigator (PI) and forwarded through the Head of Institution concerned to the R&D Committee via FSTE secretariat. The report should be accompanied by any relevant papers submitted for presentation at meetings / conferences and for publication.

**Project Ref.:** SRGS-12-19

**Project Title:** The use of interactive conceptual approach for maximizing the enjoyment from learning green technology

Name of PI: Dr. TSANG Yiu Fai

Affiliated Institution: The Hong Kong Institute of Education

**Project Duration**

Starting Date: (DD/MM/YY)	01/12/13	Completion Date: (DD/MM/YY)	31/03/14	Duration: 4 Months
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**Project Finance**

Category	Approved Budget (HK\$)	Expenditure (HK\$)	Balance (HK\$)
a. Manpower	47,670	44,545.8	3,124.2
b. General Expenses	12,000	12,000.0	0
c. Others	0	0	0
<b>Total:</b>	<b>59,670</b>		

## **Research Objectives**

### **I. Planned Project Objectives**

**The specific objectives of the project are:**

- (1) To design and develop teaching kits and to conduct workshops to facilitate students to learn and understand the concepts of Green Technology;**
- (2) To assess the understanding of students with the proposed teaching kits through their creations of Green Technology models in the trial workshop;**
- (3) To modify the proposed teaching kits based on the comments from tertiary education institutions and schools and provide professional advice on and technical support for the relevant curriculum.**

### **II. Realisation of Project Objectives**

**An interactive conceptual approach was developed in the project to maximize student interest in learning Green Technology concepts. This project also successfully encouraged and supported the teaching and learning of Green Technology in tertiary education institutions and secondary schools in Hong Kong through the proposed teaching kits and activities.**

**The prototypes of six teaching kits involving different topics (water reuse, wastewater/air treatment, sustainable and renewable energy) were designed and fabricated can be used as an interactive conceptual approach for “maximizing” the students’ enjoyment from learning of Green Technology and to facilitate the understanding of the fundamental concepts with the proposed teaching kits and workshops. By using the universal building component in the teaching kits, students have to create their own model based on the selected topics or theories. Figures 1-6 shows the prototypes of the teaching kits. The hardware components were tailor-made based on the course contents and student needs in different educational institutions.**

**Three seminars were designed and organized for participants to exchange innovative ideas and current concerns in Green Technology and Environmental Protection). Apart from seminars, six interactive workshops were organized for teachers and students (Figures 7-10). The workshops covered the basic concepts of Green Technology, introduce scientific ideas and emphasize on technological implementation. An evaluation for the proposed teaching kits and activities was conducted. The programme could facilitate students’ understanding of the fundamental concepts of Green Technology, Renewable Energy and Water Treatment (Table 1, appendix 1). The results indicated the programme could**

effectively enhance the learning of these concepts through the model-making project using the six tailor-made teaching kits.

School visits were provided to facilitate face-to-face discussions on the professional training and technical supports for school teachers.

### **Project Outcomes / Deliverables**

#### **I. Planned Project Outcomes / Deliverables**

##### **Phase 1:**

**Complete the production of the hardware teaching kits for teaching staff. The target users are teachers in tertiary education institutions (at both sub-degree and degree levels) and secondary schools in Hong Kong, who are responsible for teaching Green/ Environmental Technology and Liberal Studies subjects respectively.**

##### **Phase 2:**

**Conduct three seminars for teachers to share good teaching and learning practices through:**

- **Two workshops for secondary schools**
- **One workshop for higher education institutions**

**(Five to eight schools will be selected for face-to-face discussions)**

#### **II. Achievement of Project Outcomes / Deliverables *(supplemented by evidence)***

**The production of the hardware teaching kits (6 systems) was completed by the end of Jan 2014 for teaching staff in tertiary education institutions (e.g. HKIEd) and secondary schools (e.g. Lee Kau Yan Memorial School), who are responsible for teaching Green/ Environmental Science and Liberal Studies subjects respectively. Some labsheet templates were also prepared for teacher as a reference.**

**Two seminars were organized for Lee Kau Yan Memorial School's teachers in Feb 2014 and one seminar was organized for teachers who joined Student Environmental Protection Ambassador Scheme 13/14- Environmental Training Workshop organized by HKIEd.**

**Two workshops were organized to demonstrate the teaching kits for secondary school students in Feb 2014 and one workshop was organized for HKIEd students who are studying Environmental Science in Jan 2014. Five visits were conducted for face-to-face discussion about the development and enhancement of teaching kits from Jan to Feb 2014.**



Figure 1 Sustainable water treatment system (water + air treatment)

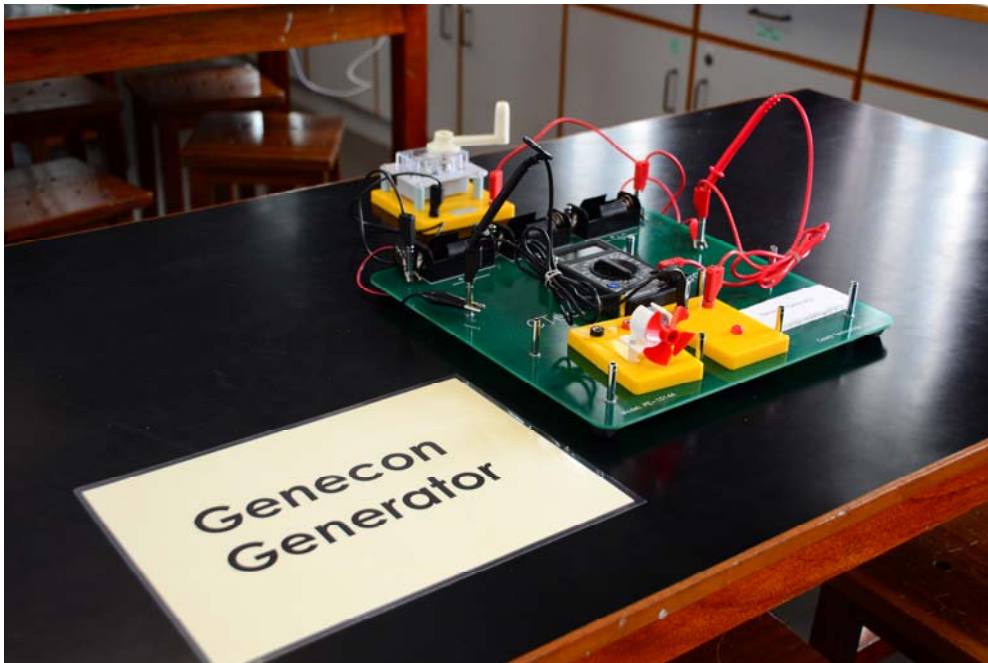


Figure 2 Hand crank generator

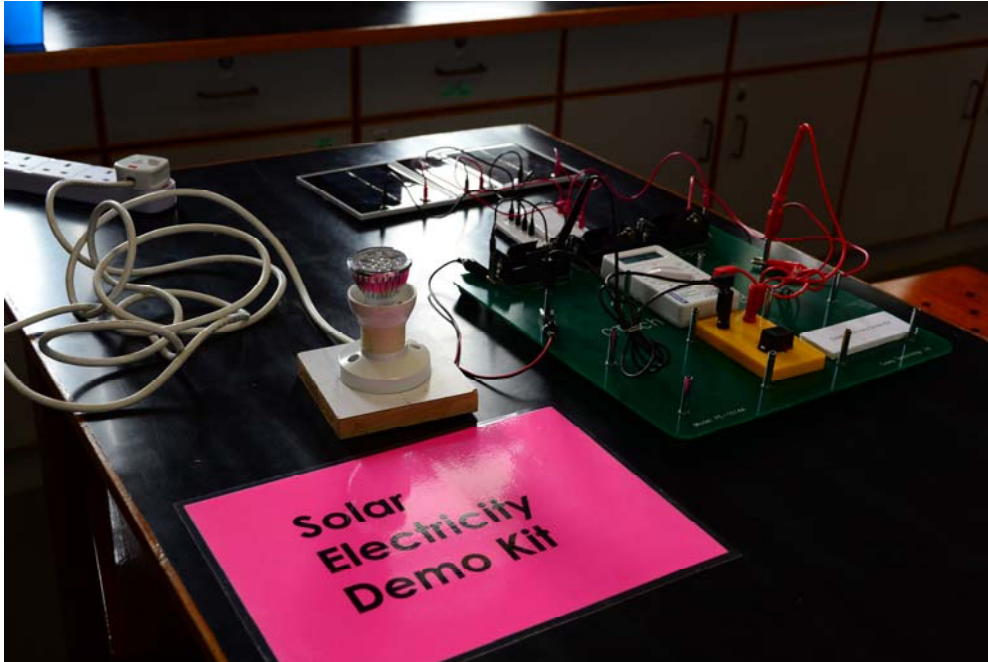


Figure 3 Solar energy demonstration kit

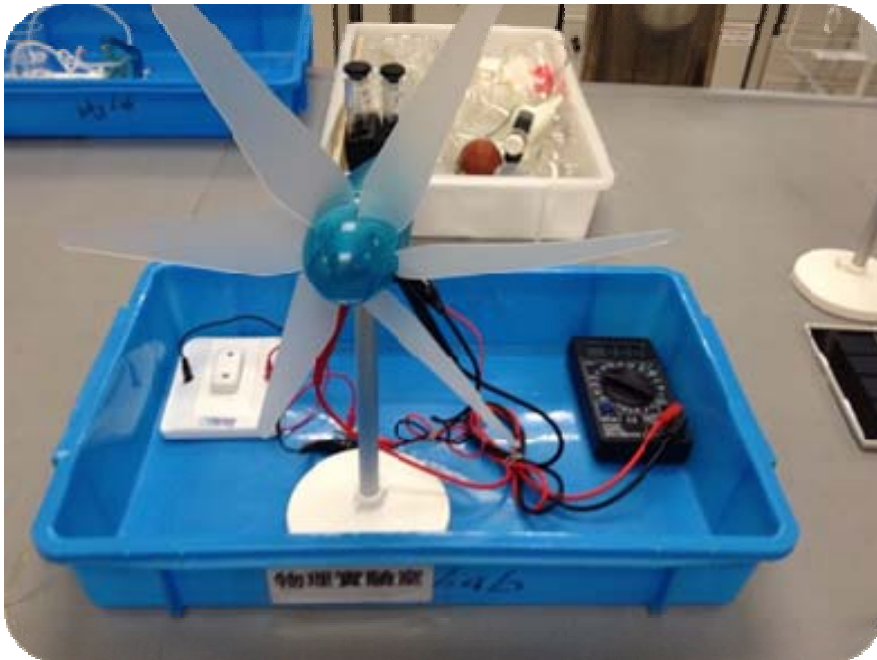


Figure 4 Wind energy demonstration kit

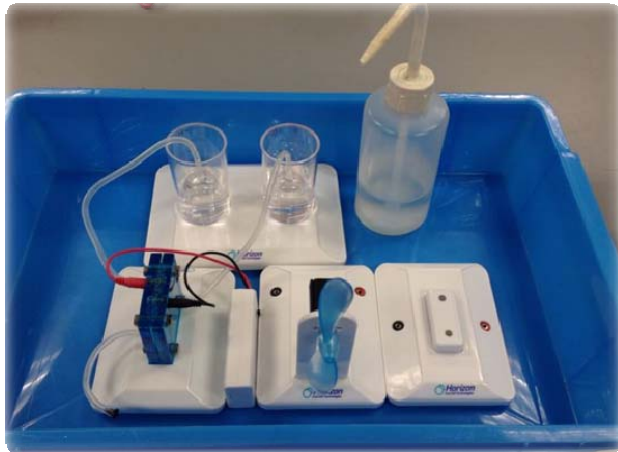


Figure 5 Fuel cell renewable energy demonstration kit



Figure 6 Hydropower demonstration kit

Table 1 Summary of the evaluation survey (n = 316)

	Score 5 or above out of 10 before the programme	Score 5 or above out of 10 after the seminar	Score 5 or above out of 10 after the workshop
Green Technology	59.96%	80.06%	83.54%
Renewable Energy	68.04%	81.65%	82.59%
Water Treatment	61.39%	79.42%	84.17%



Figure 7 Seminar at Lee Kau Yan Memorial School



Figure 8 Workshop at Lee Kau Yan Memorial School (Water)



Figure 9 Workshop at Lee Kau Yan Memorial School (Renewable energy)

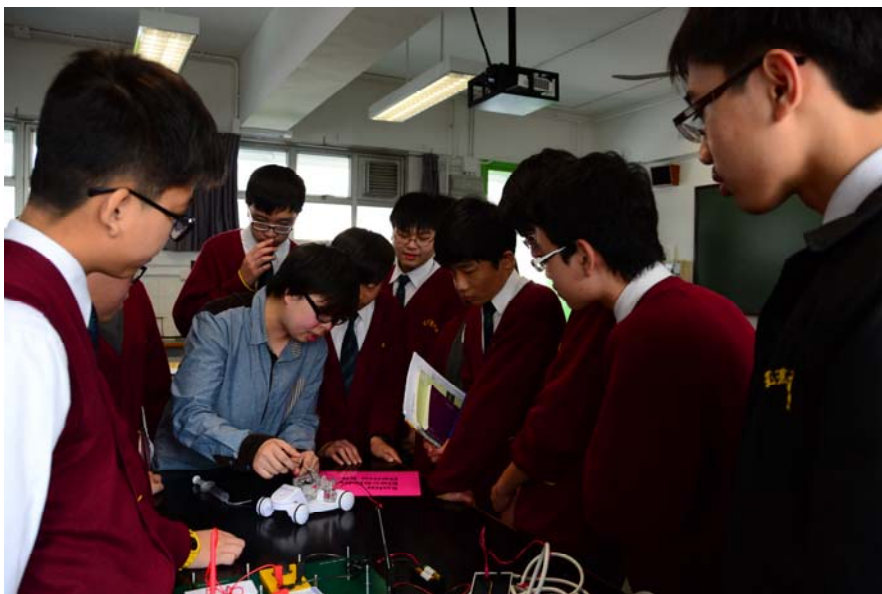


Figure 10 Workshop at Lee Kau Yan Memorial School (Wind energy)



**Potential Further Development of the Project**

Through the workshops and model-making process, the implementation of this interactive conceptual learning approach will enhance student learning and help students acquire a solid understanding about the theories and fundamental concepts of Green Technology.

The project is getting on well and the expected objectives have been achieved. Deliverables should prove very useful for active learning in Green Technology theory and practice. Through the model making process of the prototype, the implementation of this interactive conceptual learning approach will facilitate studying and help students to organize thoughts, picture the sequence of events of theory, and understand fundamental concepts without forcing to memorize formulas or equation, instead of just memorizing all materials for examinations.

Through the creation of their own teaching kits, students are provided with encouraging environment to exchange ideas, compare design, and access more detailed information about Green Technology. On the other hand, comparing to the fixed and illustrative experimental set up in the laboratory, the flexible universal component kit can result in something new every time with the creativities of students.

**Signature of Principal  
Investigator:**

**Name (in BLOCK letters):** Dr. TSANG YIU FAI

**Date:** 6/4/2014

**Certified True and Correct by the Grantee’s Institution**

On behalf of the institution, I hereby certify that all information contained in this final report is true, correct and complete.

Institution Chop

**Signature of Head of  
Institution:**

**Name of Institution’s Head:** Prof. SO Wing Mui, Winnie

**Date:** \_\_\_\_\_

機構： 香港教育學院科學與環境學系 與 可持續發展教育中心

日期： 2014 年\_\_月\_\_日 參與人數： \_\_\_\_\_

參與學校： \_\_\_\_\_

本問卷旨在收集你對學校工作的意見及統計能否增加學生對綠色科技及處理技術的認識。

問卷是以不記名方式進行。

1. 在 <u>尚未</u> 參與此次活動前:		完全不認識										十分認識
		1	2	3	4	5	6	7	8	9	10	
a.	你對 <u>綠色科技</u> 的認識有多少分?	9.81%	4.11%	10.76%	18.35%	28.48%	10.44%	9.18%	4.43%	1.27%	3.16%	
b.	你對 <u>再生能源</u> 的認識有多少分?	5.38%	4.11%	8.54%	13.92%	29.43%	16.77%	9.49%	6.65%	1.27%	4.43%	
c.	你對 <u>水質處理技術</u> 的認識有多少分?	7.91%	6.65%	11.39%	12.66%	31.01%	12.03%	8.54%	4.11%	1.90%	3.80%	
2. <u>講座</u> 部份：		不同意/ 完全不認識										同意/ 十分認識
		1	2	3	4	5	6	7	8	9	10	
a.	講座內容充實	2.53%	1.27%	4.43%	10.13%	29.43%	15.19%	11.71%	8.54%	4.75%	12.03%	
b.	講座內容切合主題	0.95%	0.95%	3.48%	9.18%	24.68%	18.35%	10.76%	11.39%	9.81%	10.44%	
c.	參與講座後,你對 <u>綠色科技</u> 的認識有多少分?	3.48%	2.53%	5.06%	8.86%	25.00%	21.20%	12.03%	9.49%	7.28%	5.06%	
d.	參與講座後,你對 <u>再生能源</u> 的認識有多少分?	3.48%	1.90%	4.11%	8.86%	22.47%	21.20%	13.29%	12.03%	7.28%	5.38%	
e.	參與講座後,你對 <u>水質處理技術</u> 的認識有多少分?	4.11%	1.90%	4.75%	9.81%	26.27%	14.87%	12.97%	12.34%	6.96%	6.01%	
f.	講座的長度時間適中	7.28%	4.11%	5.70%	11.71%	26.58%	13.61%	7.59%	9.18%	4.75%	9.49%	

3. <u>工作坊</u> 部份：	不同意/ 完全不認識										同意/ 十分認識	
	1	2	3	4	5	6	7	8	9	10	9	10
a. 模型讓我更能明白綠色科技應用	3.80%	1.90%	4.11%	10.44%	25.32%	18.04%	17.41%	7.91%	4.11%	6.96%		
b. 工作坊的內容切合主題	3.48%	2.22%	2.53%	7.28%	25.00%	20.25%	14.87%	8.23%	6.96%	9.18%		
c. 參與工作坊後,你對 <u>綠色科技</u> 的認識有多少分?	3.16%	0.95%	3.80%	8.54%	23.42%	18.67%	19.30%	9.49%	6.33%	6.33%		
d. 參與工作坊後,你對 <u>再生能源</u> 的認識有多少分?	4.11%	1.27%	3.80%	8.23%	22.47%	16.46%	18.67%	9.49%	8.54%	6.96%		
e. 參與工作坊後,你對 <u>水質處理技術</u> 的認識有多少分?	2.53%	3.16%	2.85%	7.28%	24.05%	16.14%	18.35%	9.81%	7.59%	8.23%		
f. 工作坊部份長度時間適中	3.48%	3.16%	3.16%	7.91%	21.84%	18.04%	14.56%	13.29%	6.65%	7.91%		
4. 整體評價：	1	2	3	4	5	6	7	8	9	10		
對工作坊的整體評價	2.53%	1.27%	5.38%	6.96%	20.57%	15.19%	14.87%	15.19%	9.49%	8.54%		

5. 如果將來再有類似的活動，你希望再次參加嗎？

77.22% 希望 22.78% 不希望 (原因: \_\_\_\_\_)

\*請於適用方格內填「✓」號

6. 你對此工作坊之意見/建議 (例如：主題、日期、時間、地點、形式.....等)：

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如有任何疑問，歡迎致電 2984-8122 或電郵 [tsangyf@ied.edu.hk](mailto:tsangyf@ied.edu.hk) 與項目負責人曾耀輝博士聯絡。

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