Part C Project Details

Background

The society promotes capitalism in the form of consumerism. To fulfill the endless need of consumerism, natural resources are depleted at an unprecedented rate to generate commodities, creating all sorts of environmental problems. As the cycle continues to spiral downward, many young people fear the future, believing themselves to be powerless to change the society and the environment. This is because empowering environmental studies and behaviour changing program are still missing from the current education program.

At Pui Kiu Primary School's（培僑小學）(the School hereafter), the General Studies（常識課）emphasised on learning to become Global Citizens and a key aspect is to raise environmental awareness. However, the current curriculum does not have a hands-on practical dimension to empower the students to create a positive change for the environment. The Loop Program is developed to compliment the current General Studies curriculum as an extracurricular activity by providing practical activities to consolidate the students' development as Global Citizens. Thus, the student can be equipped with a positive worldview to face the challenges in the 21st century.

The Loop Program is a spin-off from the "**Reconnect**" concept, which refers to the connection that the human being have with the environment. The society is disconnected from the environment in a sense that they produce a tremendous amount of waste without realising the impact they impose on the environment. The awareness of the environment is raising but the messages are often scattered and the required effort to make a change is often too daunting, prohibiting one from choosing to live a sustainable lifestyle.

In light of this, the Loop Program is designed to empower the students to create a positive change. The Program has a carefully designed organic farming program which is connected with food waste recycling activities. Students can learn via these activities the importance of the reconnect concept. In February 2013, the Loop Program (現代農夫) was first launched as a pilot Program under the Parents and Teachers Association's (PTA) initiative at Pui Kiu Primary school. It was conducted as an extra-curriculum activity under General Studies over the course of 11 weeks. A group of 17 students from Primary 4, 5 and 6 participated in the Program during the first half of 2013. This proposed Loop Program is an enhanced version base on the experience from this previous trial.

The Loop Program

The Loop Program is divided into three phases:

- Phase 1 The Loop (Mar – Jun 2014) – the "*Learning Stage*"
- Phase 2 Summer Project (Jul – Aug 2014) – the "*Self learning Stage*"
- Phase 3 Green Ambassador (Sep – Feb 2015) – the "*Make-A-Change Stage*"

Phase 1 The Loop - the "Learning Stage"

During the first phase "The Loop", the students will need to carry out food waste composting, building an organic garden utilising the compost. Apart from that, the Program will also involve teaching the students the associated environmental issue and utilising wireless remote sensors to monitor the plant growth environment and analyse its effects. The students will get to learn the scientific aspects of planting by examining the data updated to a website. A 21 day Behavioural Changing Program will be run in parallel as homework to motivate the students to develop good environmental habits. The Program is celebrated in the end with a bazar selling organic vegetables to the school community. The students will get to present the fruits of their labour to the school community and to communicate the message of reconnect.

Phase 2 Summer Project - the "Self learning Stage"

In order to sustain the interest and to make a lasting impact, the students will be trained in the second phase "Summer Project" to become green ambassadors to teach their fellow classmates on how to develop an organic garden. Each student will take up a planting related project to conduct self-learning guided by the Loop Program staff.

Phase 3 Green Ambassador Program - the "Make-A-Change Stage"

The legacy of the Loop Program will be strengthened through the "Green Ambassador" Program. A pair of trained students from the Summer Project will take up a class as their "students" to teach the class about green gardening guided by the tutor. In this way, the students would create a legacy by establishing themselves as role models, empowering them to "Make-A-Change".

Goals and objectives

The **short term goal** is to change the individual student behavior on environmental aspects. The short term objectives are:

1. Raise awareness – by delivering a holistic environmental education program for the School's General Studies extra-curriculum class, integrating practical organic gardening activities, theoretical learning, scientific monitoring and analysis and green ambassador training program for the students.
2. Individual behavioural change - by engaging the students in the 21 day Behavioural Change Challenge Program to challenge the students to develop good environmental habits. The Program is tied in with the integrated communication technology for the students to track their progress interactive via the website.

The degree of success can be measured by the performance reflected in the student handbook and the associated website traffic.

The **long term goal** is to change the community behavior via individual efforts to create a better environment. The long term objectives are:

3. Community behavioural change – the Program is not limited to the enrolled students,

but to reach out to the community and to create a "ripple effect", by engaging the fellow students, family, teachers, school leadership, and to the wider community through the Green Ambassador Program.

4. Better environment – ultimately, with a changed community behavior geared with individual change, the establishment sustainable community initiatives such as "Green club" and/or on-site food waste composting may be achievable in the future.

Conceptual Framework: The Reconnect Framework

The relationship between these four objectives is depicted in the conceptual framework as shown in Figure 3.1. These four objectives make up the Reconnect Framework, which is based on the well-known Ajzen Theory of Planned Behaviour[1]. The Reconnect Framework outlines the conceptual procedure to reconnect the students back to the environment, and ultimately mobilising the community to create a better environment.

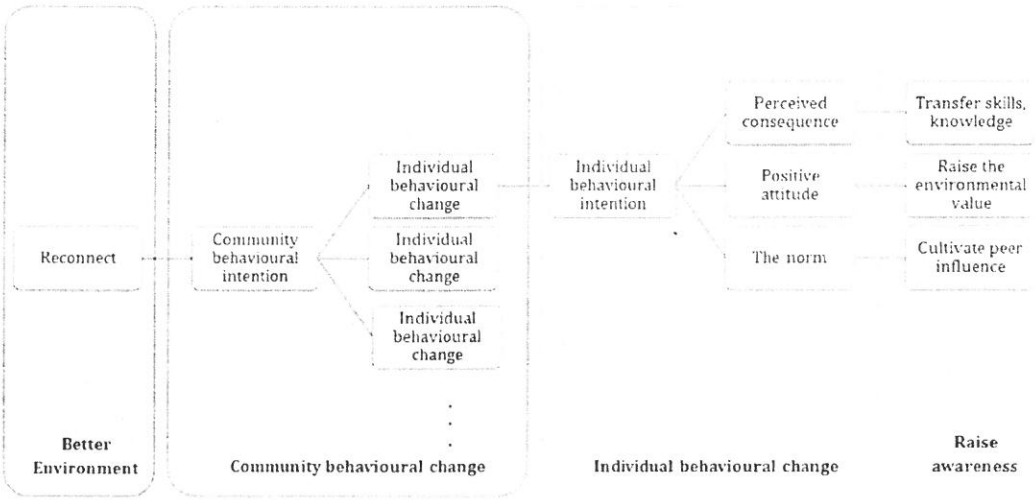

Figure 3.1 The Reconnect framework

The framework is comprised of four components, namely: 1) Raise awareness, 2) Individual behavioural change, 3) Community behavioural change, 4) Better environment. The "Reconnect" process begins with raising awareness by (i) transferring skills and knowledge, (ii) raising the environmental value and (iii) cultivating peer influence. These three elements in turn influence (i) perceived consequence, (ii) positive attitude and (iii) the norm. These three elements are fundamental to influence an individual's intention based on the Theory of Planned Behaviour. Through the changed individual behavioural intention, changed individual behaviour can be expected. Similarly, through the many-changed individual behaviour, the community can be mobilised in a similar fashion. Only when the community is motivated to "do better", then can a better environment be cultivated, and ultimately, reconnecting the community back to the environment.

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[1] Ajzen, I. (1990) The theory of planned behavior. Organizational Behavior and Human Decision Processes. 50(2):179-211.

Needs Assessment and Applicant's Capability

Limited existing resources

The General Studies cover some elements of environmental studies and one of the six strands in the General Study curriculum is to raise the awareness of the environment. However, there is no platform for the students to consolidate or to practice the theory that they learn from the General Studies. By providing the Loop Program as an extra-curriculum activity, this could greatly reduce the load and time commitment from the teachers who otherwise would not the resources to facilitate.

School's capability

Pui Kiu Primary School is home to five Chief Executive Teaching Excellence Awards (Chinese, English, Maths, Sports and Arts). The teachers at Pui Kiu Primary School strive to excel by delivering innovative teaching programs. The School has cultivated an interactive learning culture which enables the students to learn outside the boxes. It is precisely this culture, which provides the foundation for Loop Program to take off because both the students and the teachers are willing to learn interactively.

Targets and Expected Number of Beneficiaries

The number of beneficiaries is expected to reach 3000 people. This includes the general studies teachers, environmental education teachers, curriculum developers, the students directly and not indirectly involved in the Program, and their families. The breakdown of the beneficiaries is as follows: 10 school teachers, 20 students in the course, 120 students involved in the Green Ambassador Program, 820 students engaged in the outreach program activities, and the associated 1000 families, yielding in total 3000 individuals.

Innovation

21 day Behavioural Change Challenge Program

During Phase 1 of the Loop Program, there is an accompanying 21 day Behavioural Change Challenge handbook for the students to follow to implement selective good environmental habits. The students need to carry out a number of good environmental habits as homework and they are challenged to commit to these habits over the course of 21 days for each good environmental habit. The students who achieve the required tasks are awarded with the produces that they have grown in the organic garden. There is an online version of the 21 day Behavioural Change Challenge Program on the website for the students to keep update to-date their progress.

Green Technology – Wireless Environment Sensing System

The students are exposed to the latest green technologies through the wireless environment sensing system. The Program is tied in with a self-powered energy-efficient wireless sensor network, which monitors the environment factors in relation to the geographical location, seasons, and weather. Through acquiring real-time environment information from the network, the students are provided a platform to explore the science behind gardening. The system gives the student with the ability to monitor the plant growth closely and alert the students to control irrigation and application of nutrients to plants as the needs arise.

On the hardware, the cable-free features and self-powered feature allow easy deployment in any locations of the school, which can greatly enhance the installation flexibility. In addition, the low-power real-time wireless monitoring system which only amounts to 1% of the total transmit power of the WiFi is also demonstration of an energy saving technology. An additional bonus with the implemented wireless sensor network is that it can facilitate other applications such as energy consumption monitoring and air-quality monitoring in the School.

Integration of information into a website

The website displaying the environmental data from the wireless sensing system will also display the "Flower Happiness Index", which integrates the various environmental data to provide an indication of the plants' growth. This is an innovative and a "fun" method of demonstrating the effects of environmental factors have on the plants. Apart from the index, the website also provides the teaching materials for the students to download.

Green Ambassador Program

A successful education program should motivate students to do self-learning passionately and enthusiastically. This is precisely the purpose of the Green Ambassador Program, equipping the students with the skills and raising their passions to "reconnect". If sufficient interests are raised among the students, the Green Ambassador Program can potentially paved the way for development of an environmental club within the School. Refer to Section 3.1 for details of the Green Ambassador Program.

eBook and QR code

An online version of the Program handbook is available for students and other audience (e.g. their peers, families and etc.) to browse at their own time. This electronic handbook includes graphical animation to explain the key messages of the Program in interactive way to enhance the overall learning experience. The handbook also combines with the above mentioned 21 day Behavioural Change Challenge Program. In addition, specific QR codes will also be generated to link to different section of the handbook for the ease of referencing. The QR (Quick Response) codes can be displayed in the organic garden for any interested parties to access the website for further information.

Integration with School-based curriculum

The Program is closely integrated with the School-based curriculum by providing opportunities for the students to practice the knowledge they learned from the School curriculum. The following table summarises the integration between the Program and the School-based curriculum (Table 3.1)

Table 3.1 Integration with School-based curriculum

Curriculum	Topics	Loop Program
Grade 2 GS	Plant growth	Students will conduct organic farming and monitor the plant growth factors such as sun light, temperature and humidity through the real-time wireless sensor system.
Grade 3 GS	Farmers	Students learn to become farmers by sowing, watering, fertilising and looking after the plants. The students are on a roster basis to water and check up on the plants on a regular basis.
Grade 4 GS	Air, water, waste environmental problems	Students learn about the methods of tackling environmental problems such as greenhouse gas, eutrophication and food waste through composting and organic farming.
Grade 6 GS	World crisis such as food storage, poverty	Before each organic farming session, there is a theory session in which the students learn about the consequences of the environmental problems through interactive games. After the games, the students are asked to express their views about the current world environmental crisis. This can deepen their knowledge by verbally expressing their opinions.

Extent of Teachers' and Principals' Involvement in the Project

The Principal and teachers are expected to be involved in the Loop Program to various extents to help foster a sense of community. The **Principal** will be involved in the kick-off and debriefing meetings, and also the charitable bazaar. The **General Studies Teachers** are involved during the class to help manage the students and also to brief the students about the Program and expectations. The teachers will also run a debriefing session at the end of each phase to help consolidate the progress.

A well experienced General Studies teacher from Pui Kiu, will be involved as the leading teacher responsible for co-ordination. She has 15 years of experience in primary school teaching. For the last 12 years she has been teaching at Pui Kiu Primary School. She is one of the core members in the General Studies team, taking responsibility as a Vice Panel member for the last 6 years. Apart from majoring in General Studies as part of her Postgraduate Diploma in Education Primary Programme. She is also specialised in English Subject Teaching and Subject Knowledge Stream through her Postgraduate Diploma in Education.

Equipping the teachers with relevant professional knowledge

Although the General Studies teachers are not expected to deliver the course themselves during the first year, the teachers will be trained on the job to learn about planting skills, environmental knowledge and the utilisation of the wireless sensing system. Their professional competency will be enhanced by learning and observing as the supporting teachers. Furthermore, two trainers will be recruited to train the teachers to equip them with the knowledge and skills to run the Program. The teachers will be trained on how to deliver environmental teaching interactively through organic farming. Also they will be

trained to use the data obtained from the wireless sensing network to teach students how to monitor the plant growth. These measures are in place to ensure that the General Studies teachers are capable to deliver the course themselves to sustain the Program in the long run.

Implementation Plan with Time-line

The Program timeline is presented in Table 3.2.

Table 3.2 Loop Program Timeline

Wk	Lessons theme	Activities	21 day Behavioural Change Challenge	2014											
				J	F	M	A	M	J	J	A	S	O	N	D
1	Brief from teachers														
Introduction															
2	Program overview - loop concept	Collect/process food waste	Collect recyclable materials												
3	Science of planting - environmental factors	Start planting													
4	Encourage behavioural change	Use of handbook and website													
Food waste															
5	Waste profile of Hong Kong	Food waste + fertilizing + stickers	Finish meal to minimise food waste												
6	Landfill issues	Transplant													
Composting															
7	Mitigation of greenhouse gas	Drawing + afternoon tea	Energy saving actions												
8	Aerobic and anaerobic composting	Harvest													
Planting															
9	Organic vs. non-organic farming	Aerobic compositing box + food waste liquid	Rinse fruits thoroughly to remove fertilizer residues												
10	Smart planting - wireless sensor system	Transplant													
11	Smart planting - aquaponic eco-system	Field trip - site visit of the real farm													
Happy Harvest															
12	Data interpretation	Data Interpretation	Prepare for bazaar												
13	Bazaar	Selling organic vegetable													
14	Debriefing from teacher on Phase 1 The Loop														
Summer Project															
15	Training students														
16	Summer project														
17	Debriefing on Phase 2 Summer Project and student report														
Green Ambassadors															
18	Deployment of green ambassadors to classes	Planting in class	Responsible for watering and looking after plant												
19	Debriefing on Green Ambassador experience														

Expected Deliverables and Outcomes

The expected outcomes are multi-faceted, covering not only intellectual growth and behavioral changes of the students, but also creating a ripple effect for the community. On

the tangible outcomes, it is expected that the handbook developed for the 21 day Behavioural challenge Program can tied in together with the website and develop as a commercialised product.

Budget

The budget is presented in Table 3.3.

Table 3.3 Budget for Loop Program

Category	Items	Unit Price	Unit	Quantity	Budget	Sub-total
A Staff Cost	Primary school teacher (graduate) responsible for delivering the Program	1063	/day	19	20,197	47,887
	Staff trainer (experts on environmental studies and wireless sensors)	630	/Hour	23	14,490	
	Project Assistant (Provide co-ordination for liaising with suppliers, teachers, trainers, designers, technicians)	13,200	/month	1	13,200	
B Equipment	Electronic Environment 4-Sensors Pack (light intensity, humidity, temperature, soil moisture)	2,500	/Set	5	12,500	90,460
	Compact Outdoor Energy-autonomous Low-power Wireless transmission module with weather-proof casing (Solar panel, rechargeable batteries included)	3,500	/Set	5	17,500	
	Low-power Wireless Sensor Network Basestation with Wifi/3G Internet Gateway, Database and Webserver	7,500	/Set	1	7,500	
	Real-Time Monitoring Software Platform with Notification Centre and Graphical Webpage for PC, Smartphones, Tablets (Education Special License)	42,000	/Lump Sum	1	42,000	
	Software platform customization for School	5,000	/Lump Sum	1	5,000	
	Seedlings for organic farm (tomato, oriental giant radish, carrot, mint, romaine lettuce etc.)	500	/Lump sum	1	500	
	Planter box (model SS1) with fermented manure soil	180	/Box	20	3,600	
	Planting tools (small shovels, small spading folks)	40	/Head	20	800	
	Planting essentials (reusable cotton gloves, towels, watering buckets)	500	/Lump sum	1	500	
	Aerobic composting bins for digesting organic farm refuse	200	/Bin	1	200	
	Anaerobic composting bins with 2 kg Bokashi for digesting food waste	180	/Bin	2	360	
C Service	Loop Program (14 week Loop Program, 21 day behavioural changing Program, 14 week Green Ambassador Program)	30,000	/Lump sum	1	30,000	92,800
	Integrated communication technology (website, QR code, online handbook)	55,000	/Lump sum	1	55,000	
	Technical support for Integrated communication technology trouble shooting	9,000	/month	0.5	4,500	
	Technical support for Wireless Sensor Network and software platform trouble shooting	9,000	/month	0.2	1,800	
	Field trip to visit an organic farm with aquaponic (half of the cost)	75	/head	20	1,500	
D General Expenses	Audit fee	5,000	/Lump Sum	1	5,000	10,450
	Printing for course materials	1	/Page	500	500	
	21 day behavioural changing program handbook printing	3,000	/Lump sum	1	3,000	
	Stationery (drawings pads for students to record the plant growth and environmental data from web)	20	/Head	10	200	
	Transportation of vegetable for Bazaar	150	/Lump sum	1	150	
	Transportation for field trip (half of the cost)	1,000	/Lump Sum	1	1,000	
	Lunch for Field Trip	20	/Head	30	600	
					Total (round up to the nearest hundred)	**241,600**

Assets Usage Plan

The assets usage plan is summarised in Table 3.4.

Table 3.4 Assets usage plan

Category	Item / Description	No. of Units	Total Cost	Proposed Plan for Deployment
Computer hardware	Electronic Environment 4-Sensors Pack (light intensity, humidity, temperature, soil moisture)	5	12,500	**Deployment** To be reused for the Program in following years and the future Green Club. **Maintenance** Maintained by service provider during the Program and transferred to the IT department for maintenance thereafter.
	Compact Outdoor Energy-autonomous Low-power Wireless transmission module with weather-proof casing (Solar panel, rechargeable batteries included)	5	17,500	
	Low-power Wireless Sensor Network Basestation with Wifi/3G Internet Gateway, Database and Webserver	1	7,500	
Computer software	Real-Time Monitoring Software Platform with Notification Centre and Graphical Webpage for PC, Smartphones, Tablets (Education Special License)	1	42,000	
	Software Platform Customization for School	1	5,000	
	Intergrated communication technology (website, QR code, online version of booklet)	1	55,000	

Evaluation parameters

Reflective evaluation is performed throughout the Program for its 1) external influence and 2) internal performance (Table 3.5). The Program's **external influences** are evaluated during the Program, with parameters drawn from the Reconnect Framework (Figure 3.1). The Program's **internal performances** are evaluated at the end of the Program by examining the performances of the project team.

Table 3.5 Evaluation parameters

Parameters	Evaluation Method	Targets
External influences		
Influence on individual behaviour	The 21-day Behavioural Change Challenge Program handbook utilisation and the related website traffic will showcase the individual behavioural change.	100% handbook completion by the students.
Influence on the community behaviour	Throughout the Program, videos will be taken to record the students' learning process. The videos will be played during the morning assembly and also uploaded to the Pui Kiu Primary School Youtube channel.	The impact to the community can be evaluated by the number of view on the Youtube channel and also the feedback from students who watched it during the morning assembly. Their feedback could also be recorded in videos.
Influence on the environment	Survey to evaluate intention to establishing a "Green Club" made up of students who participated in the Loop Program.	Over 50% of the Loop Program students who support and willing to participate in the establishment of a "Green Club".

Internal performance		
Program team	Evaluation by the School Project Team Leader on the teaching quality, the program management, program structure, program materials and program concept.	Achievement to be of good standard and the program schedule is carried out as planned.
School	Survey to be completed by the teachers on their growth and their learning experiences.	Achievement to be of good positive influence for all teachers.
Students	Survey during debriefing at the end of each of the three phases on the students' learning experience and enjoyment.	Over 80% of the students finding the program a positive learning experience.
Other factors	Evaluation by the School Project Team Leader on the level of harvest, and supplier service.	Achievement to be of satisfactory standard or above.

Sustainability of the outcomes of the Project

The sustainability of the Program can be ascertained through the following initiatives:

- Obtain subsidies from the Parents and Teachers Association (PTA). Since most of the hardware will be acquired after the first year, a minimal amount of money is required to sustain the Program by subsidising the material costs. In addition, the General Studies teachers may be able to teach the course themselves without contracting services.
- The students who participated in the Loop Program will be trained to become Green Ambassadors for the School. The ex-students who participated in the Loop Program may become members of the "Green Club" out of their own initiatives. In this way, the Program can be sustained and "looped" again the future to train more Green Ambassadors for the schools.
- In terms of the hardware, the installed wireless sensor network system can be connected to the energy consumption and/or air quality monitoring system for learning purposes, expanding the learning scope of the Program.
- The 21 day Behavioural Change Challenge Program handbook can be commercialised.

Dissemination / Promotion

The Program will be promoted via:

- The Program kick-off – the Program will be announced during the morning assembly, in which the Loop Program students will be greeted and welcomed to the Program.
- Playing videos in the morning assembly – during the course of the Program, videos taken during the classes will be played in the morning assembly and also uploaded to the School's YouTube channel.
- Posters – flyers and posters will be placed in the school notice board to introduce the types of vegetables planted in the organic garden, updating the school community on the latest development.
- The organic garden – the organic garden is placed in an open area in which the

students and the staff can access freely. The mere presence of the organic garden will attract by-passers and generate interest. An information board will be placed near the organic garden to explain the program details.

- Website and QR code – specific QR codes are generated to link to different section of the handbook for the ease of referencing. The website serves for two purposes. Firstly, the website is used as a point of information for the students to access the monitoring data (via the wireless sensor). Secondly, interested parties can access the website for further information. Refer to Section 3.6 for details.
- Notification System - interactivity tools like the notification systems of the wireless sensor network platforms can broadcast emails on the general status of the organic farm and also send notifications/alerts to students if extreme environmental conditions are encountered.

Report Submission Schedule

My school commit(s) to submit proper reports in strict accordance with the following schedule:

Project Management		Financial Management	
Type of Report and covering period	**Report due day**	**Type of Report and covering period**	**Report due day**
Final Report 1/3/2014 - 28/2/2015	31/5/2015	Final Financial Report 1/3/2014 - 28/2/2015	31/5/2015