

# **Hwa Chong Institution Project Work 2021**

## **Category 4**

### **Title of Project:**

Project Change (Previously called Project Disposal)

### **Group:**

4-050

### **Group Members:**

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## 1. The problem

- 1.1 HCI HS students have been repeatedly lectured about our poor waste disposal habits after eating in class. We are supposed to dispose of used food packets into black garbage bags which are then to be thrown away in the large green bins at various locations around the school grounds. Instead, we throw our used food packets into the brown garbage bins outside our classrooms. The brown garbage bins overflow with rubbish and cause problems: the food remnants may attract cockroaches and other pests which pose a health hazard to people<sup>1</sup> and the school's property has also been damaged - stains on the floor tiles in one area of Block C cannot be removed<sup>2</sup>.
- 1.2 Furthermore, many HCI HS students are not really aware of green behaviours in general and how to be environmentally friendly.
- 1.3 Around the same time, the Singapore government released the Singapore Green Plan 2030 and schools have a role to play.
- 1.4 After completing our literature review (please see Section 3 below), we therefore decided to address a) the poor garbage disposal habits problem, b) HCI HS students general lack of green behaviour and also c) help HCI HS become a leading green school in Singapore. Our research and user needs analysis were conducted with all three goals in mind.

## 2. Literature review

- 2.1 Ifegbesan (2010) found that high school students were aware of waste problems on their school compounds but possessed poor waste management practices. Paghasian (2017) found that the awareness of solid waste management of students had no influence on their practices in terms of disposal. Liao and Li (2019) found that, despite social norms and pressure from "essential others" around them which the students felt, these norms and pressures did not appear to influence students' intention or behaviour.
- 2.2 In the SG Green Plan 2030, Sustainable Living is a key pillar and schools and students are expected to play a role; the government aims to "enhance the integration of environmental sustainability in schools and strengthen the building of informed, responsible and sustainability-conscious *mindset and habits* (emphasis ours) in students" (SG Green Plan 2030).
- 2.3 Lavelle, Rau and Fahy (2015) found that education had a positive impact on pro-environment behaviour. Liao and Li (2019) found that attitude is the greatest predictor of intention and intention is positively influenced to a significant extent by environmental education and environmental knowledge.
- 2.4 Other researchers point specifically to the need to educate secondary school students (Ajaps & McLellan, 2015; Bagoly-Simo, 2013; Taylor, Quinn, Jenkins, Miller-Brown, Rizk, Prodromou, Serow and Taylor, 2019).

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<sup>1</sup> This is based on our conversation with Mr Charles Low of the Canteen Committee via Zoom on 23 June 2021.

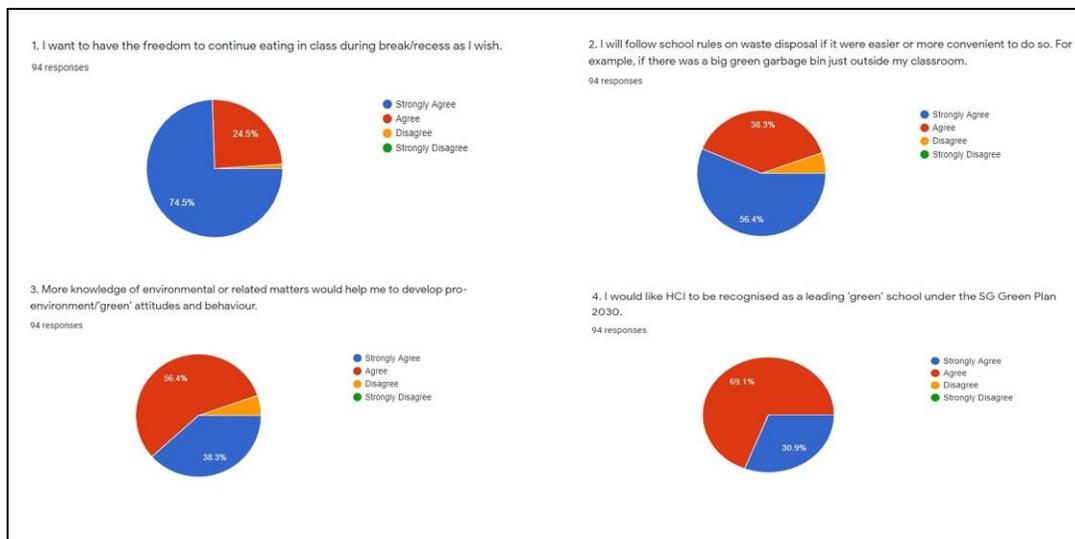
<sup>2</sup> This is based on our conversation with Mr Charles Low of the Canteen Committee via Zoom on 23 June 2021.

### 3. User needs analysis

3.1 Our user needs analysis comprised of an online survey of HCI HS students from all levels and an interview of the HCI HS Green Council.

3.2 A total of 94 HCI HS students responded to our survey. The majority of respondents indicated that they would like to have the freedom to continue eating in class during breaks and recess, that they would follow school rules on waste disposal if it were easier or more convenient to do so and that more knowledge of environmental or related matters would help them to develop pro-environment attitudes and behaviour. All respondents indicated that they would like HCI to be recognised a leading 'green' school under the SG Green Plan 2030.

3.3 Figure 1 below shows a summary of the results of our online survey.



**Figure 1. Summary of our online survey results.**

3.4 Our interview of the Green Council was structured around the following 3 questions: a) What is the Green Council currently doing about the problem of the HCI HS students' improper disposal of food packaging after eating in class? b) What is the Green Council currently doing to promote day-to-day 'green' habits among HCI HS students? c) Which of the Green Council's efforts to date have had a positive impact on HCI HS students' attitudes and behaviours towards making HCI a green/greener campus?

3.5 We found out from the interview that the Green Council has no current protocols involving the proper disposal of food packaging but it has planned many protocols and events to promote green habits among HCI HS students. Examples are the sales of environmentally friendly products, the creation and spreading of posters and informational brochures to promote green habits among students, planting and management of plants around the school as well as talks during major events such as open house to cultivate green habits in HCI HS students. We were also informed by the Green Council that students have responded positively to questionnaires used to them on their green habits in school but that there is "much more room for improvement, as seen by the

recent complaints by Teachers on environmental issues in the school”. The Green Council was open to working with us to promote the cultivation of green habits in HCI HS students.

## 4. Design thinking process

4.1 Figure 2 below shows the design thinking process we learnt in Secondary 2 Geographical Investigation, adapted for this project.

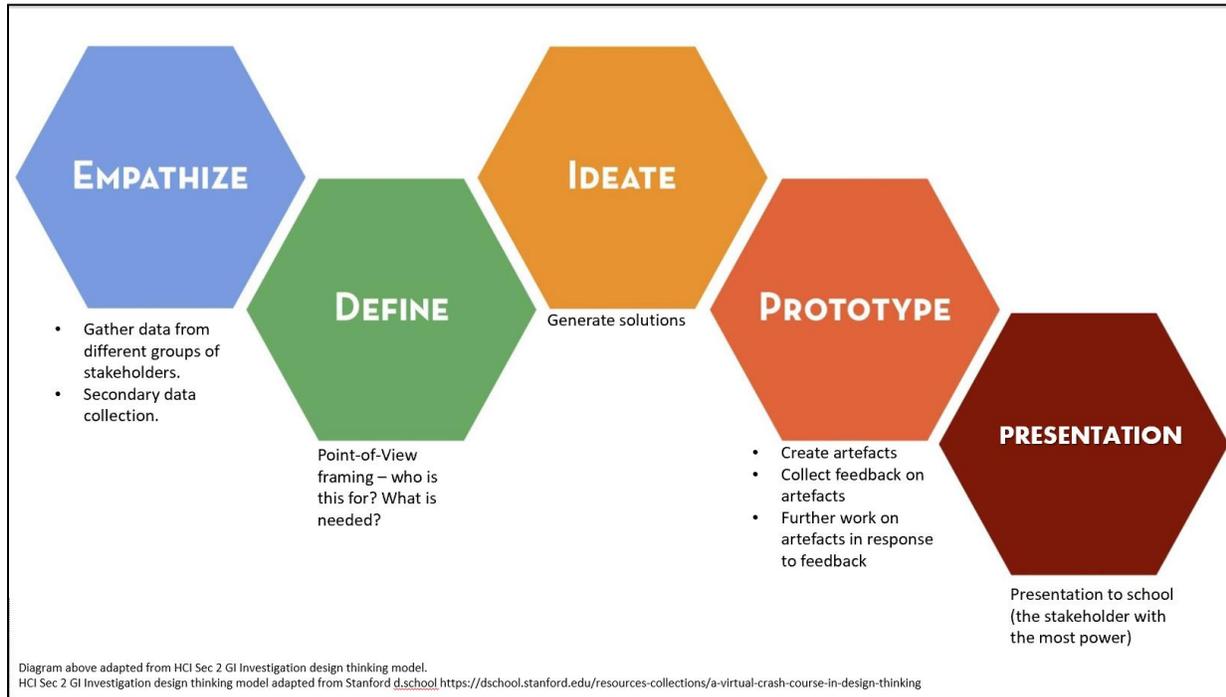


Figure 2. Design thinking process for this project.

4.2 We identified several stakeholders but in order to keep the project manageable, we decided to focus on a) HCI HS in general (e.g. our school’s reputation) and the HCI HS b) Estate Office, c) Green Council and d) students.

## 5. Aims of our project, our resource package & the usefulness of our project

5.1 We finalised the aim of our project and the contents of our resource package only after going through several iterations of the design thinking process:

### a. Iteration #1: Empathise-Define-Ideate-Presentation

We presented the proposed aim of our project and a range of resource package items to HCI HS in the form of our Project Work Proposal. Our proposal was based on our initial observations of what is going on in school, our literature review and the results of our user needs analysis.

### b. Iteration #2: Empathise-Define-Ideate

During our Project Work Proposal presentation, one of the teachers mentioned that a key issue with ‘BYO’ (bring your own) reusable containers to take away food from the canteen

is cleaning the containers. She mentioned that it would be nice to have an efficient method to clean BYO containers. We did research and came up with a proposed possibility system of using standardised reusable containers owned by the school as an alternative to BYO containers (reusable container scheme). Thereafter, we arranged to meet with Dean Mr Ng Seaw Choon.

c. **Iteration #3: Empathise-Define-Ideate-Prototype-Presentation**

Dean Mr Ng told us that our Project Work group would need to do a green audit before proceeding further with our ideas. He also pointed us to teachers in the school whom we could approach for assistance.

We reached out to the teacher-in-charge of the Green Council, Mr Lim Chuan Chia. Mr Lim shared with us the results of a green audit conducted on the HCI HS in 2015 (2015 green audit).

It was not possible for us to use existing forms or templates for school environmental audits because (a) those that were available for us to view and use are not tailored to the Singapore context and also do not account for HCI HS-specific features such as our consortium system and (b) those that appeared to be designed specifically for use in Singapore schools such as the School Green Audit questionnaire by the Singapore Environment Council and the Singapore World Wildlife Fund Eco-schools programme audit questionnaire are not publicly available. Schools needed to be officially registered with those organisations in order to access the resources.

We did research on how to create a general but relatively comprehensive green audit of HCI HS which expands on the 2015 audit in a way which takes into account the HCI HS context.

We sent a draft of our general green audit to Mr Lim and our teacher-mentor for comments. We sought the assistance of Mr Lim, our teacher-mentor and Mr Clement Koh of the Estate Office, to complete the questionnaire.

We compared the results of the completed questionnaires returned to us. We also made observations as we went around the school and filled up the questionnaire ourselves. These results show a) areas for possible further investigation using more targeted audits or other methods of data collection (such as interviews of the relevant people in charge of the affected areas), b) areas that can be improved upon with immediate effect and c) how to effect such improvements.

Our green audit questionnaire is set out in **Appendix 1**. The full results of the completed questionnaires are set out in **Appendix 2**.

While our green audit was originally prepared for our Project Work group's own use, it can also be used by the school to update the 2015 green audit.

We have therefore listed our general green audit questionnaire as the first resource in our finalised resource package.

The second resource in our resource package is the information we obtained from the completed questionnaires that were returned to us during this project (the results of our green audit).

d. **Iteration #4: Empathise-Ideate-Prototype-Presentation**

We communicated with Canteen Committee teacher Mr Charles Low to seek some feedback on the reusable container scheme we had ideated in Iteration #2. Mr Low's feedback was that our idea cannot be implemented in HCI HS. He suggested that education/awareness is important and gave us some suggestions as to how we might be able to help educate our fellow students.

We therefore came up with a) prototypes of educational posters to specifically address the poor waste disposal habits of HCI HS students of all levels and b) green activities for the general green education of HCI HS students of all levels.

While plenty of educational posters are available online or for public use, none specifically address our school-specific problem of overflowing brown bins, some items in existing resources from abroad are not suitable for the Singapore environment and culture and some local resources are too childish for secondary school students.

Hence, we designed some posters and sought students' responses to those prototype (draft) posters.

We took three different approaches to educating students/raising their awareness when designing those prototypes. One poster reflected Mr Charles Low's idea of appealing to the HCI HS students' positive attributes. Two were designed with the idea of shocking students into opening their eyes to the negative effect of their poor garbage disposal habits; this approach was inspired by the gross images which are currently printed on cigarette boxes to deter smokers from smoking. The third approach we took was to educate students on the negative effect of their poor garbage disposal habits in an interesting rather than boring way.

While there are plenty of direct, experiential learning activities available online for public use, none specifically address educational aims specific to our HCI HS context, some items in existing resources from abroad are not suitable for the Singapore environment and culture and some local resources are too childish for secondary school students. Thus, we created some green activities targeted at the ordinary HCI HS student.

The finalised educational poster is our third resource. The green activities are our fourth resource.

Prototypes of our educational posters, information on how we gathered user feedback, a sampling of the comments we received and the final design may be found in **Appendix 3**. Our green activities are set out in full in **Appendix 4**, along with information on how we gathered user feedback and a sampling of the comments we received on the initial versions.

e. **Iteration #5: Prototype-Presentation (following up on Iteration #1)**

Our user needs analysis and green audit results indicated that something should be done about the overflowing brown garbage bins resulting from HCI HS students' poor garbage disposal habits. From our literature review, we had learnt that students engage in green behaviour that does not take too much effort or cause too much inconvenience to them (Kagawa, 2007 cited in Liao & Li, 2019). This position was supported by the results of our user needs analysis online survey.

We therefore designed a proof-of-concept prototype garbage compactor as our last resource package item. The device enables garbage (including cardboard, plastic and polystyrene food and drink packages) to be compressed, meaning that more trash can be fitted into one black garbage bag. This makes it more convenient to carry black garbage bags from class out to the big, green rubbish bins located on the school grounds further away from the classrooms than the brown bins.

Details of some of the steps we went through to create this prototype (including testing results) are set out in **Appendix 5**.

5.2 To summarise, our **finalised resource package and** a list of **who the items are intended to benefit** are as follows:

S/No.	Description of resource	Intended beneficiary/user of resource
1	General green audit questionnaire	HCI HS (persons in charge of green audits)
2	Results of our general green audit	HCI HS (persons in charge of green audits, Green Council, our Project Work group).
3	Educational poster	Mainly HCI HS students of all levels but the resource could also help HCI HS teachers and staff to manage the poor garbage disposal problem. It could also be used by the Green Council in its outreach efforts.
4	Green activities	Mainly HCI HS students of all levels but the resource could also help HCI HS teachers who could use the activities instead of having to look for other activities.
5	Proof-of-concept prototype of a garbage compactor (can be deployed for immediate use in one classroom)	HCI HS students of all levels.

5.3 The **aims of this project**, ascertained based on what we started out to achieve and also taking into account stakeholder needs and feedback are as follows:

- **help to make HCI HS a leading green school under the SG Green Plan 2030**

by helping to

- **solve the problem of HCI HS students' poor waste disposal habits**

and

- **encourage HCI HS students' development of green attitudes and behaviour through educational green activities and by making it more convenient for them to practice green behaviour.**

5.4 We believe that our project is useful because it strives to provide a sustainable solution to the waste disposal problem in our school by taking steps to change HCI HS students' attitudes and behaviour. Students are supported to develop green attitudes and behaviours not just to solve the waste disposal problem but also to be more green overall. This fits the concept of sustainable development which the government wants and fits the plan for schools as set out in the SG Green Plan 2030. We hope that our efforts can contribute towards making HCI a leading green school in Singapore.

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## Appendix 1

### Project Work Category 4: PROJECT CHANGE INTERNAL ENVIRONMENTAL AUDIT FOR HCI 2021 (GENERAL OVERVIEW)

#### Objective

- HCI High School (HCI HS) aspires to be recognised as a leading green school under the SG Green Plan 2030.
- This internal environmental audit is intended to be the first step in ascertaining what the HCI High School has done well to date and what could be improved on. It is intended to be a general overview which builds on the School Green Award 2015 report. More detailed or targeted audits would be required as the school takes action to address specific areas/issues earmarked for further action.
- This approach of taking a “blanket approach” first followed by “a deep dive” is borrowed from the Austin Independent School District (Austin Independent School District, n.d.) and the Eco-Schools USA approaches to conducting green audits.<sup>3</sup>

#### Summary of aspects covered in this general audit

- A. Environmental Infrastructure
- B. Environmental Management
- C. Environmental Education
- D. Effectiveness of Environmental Education
- E. Stakeholders’ Participation in Environmental Activities
- F. Sustainable Development

#### How to complete this general audit

Please **check or highlight the indicator that describes the present situation** in HCI HS, then provide some **elaboration to explain** the indicator selected. Example:

<p>A1.1 <i>The campus is made green by growing plants.</i> <input type="checkbox"/> <i>Excellent</i>      <input type="checkbox"/> <i>Good</i>      <input type="checkbox"/> <i>Fair</i>      <input type="checkbox"/> <i>Improvement Required</i> <i>Elaboration:</i> <i>Green landscaping is part of the school’s design.</i></p>
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**THANK YOU VERY MUCH FOR YOUR TIME & ATTENTION!**

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<sup>3</sup> We are thinking that the deep dive should occur only after more information is available from the MOE on the criteria for being a leading green school in Singapore under the SG Green Plan 2030. We are also wondering whether the deep dive (when it occurs) should also take into consideration international standards so that our school can aim for recognition beyond Singapore. For example, there is the Eco-Schools Programme which is “recognised by the United Nations Environment Programme as a model initiative for Education for Sustainable Development” (Foundation for Environment Education, n.d.). This programme may be accessed through WWF Singapore and schools may strive to be “awarded with the prestigious and internationally-recognised Green Flag” (Foundation for Environment Education, n.d.).

## **A. ENVIRONMENTAL INFRASTRUCTURE**

### **A1. GREENING THE CAMPUS**

**Objective: To determine the extent of the school’s commitment in greening the campus and using the plants and trees for educational purpose.**

#### **A1.1 The campus is made green by growing plants.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that green landscaping is part of the school’s design (E3). Ideas for consideration (if not already done so): green the school through implementation of: 1) onsite composting 2) rain gardens, berms, swales, or other natural drainage features 3) rain barrels and other rainwater collection systems 4) greenhouses 5) food gardens 6) habitat gardens 7) pollinator gardens 8) hydro/aquaponics 9) native and drought-tolerant landscaping 10) ponds 11) livestock, fowl, bees, and other animals 12) natural trails 13) tree planting and care 14) natural elements such as cob or wood sculptures and benches (Austin Independent School District, n.d.).}*

#### **A1.2 The plants are labelled for educational purpose.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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#### **A1.3 A corner for practising organic farming is established.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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### **A2. CLEANLINESS OF THE CAMPUS**

**Objective: To determine the extent of the school’s commitment in involving all school members in keeping the campus clean and tidy, and beautifying the campus.**

#### **A2.1 The campus is clean and tidy.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**A2.2 The classroom and office areas are clean and tidy.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**A2.3 Washrooms are clean and odour-free.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**A3. ENVIRONMENTAL CORNER/BULLETIN BOARD**

**Objective: To determine the extent of the school's commitment in providing display and communication facilities which help to disseminate updated environmental information and encourage exchange of opinions through these facilities.**

**A3.1 A corner/bulletin for displaying environmental information is established.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school has set-up an environmental corner/hub to encourage self-learning (A18).}*

**B. ENVIRONMENTAL MANAGEMENT**

**B1. ENVIRONMENTAL POLICY**

**Objective: To determine the extent of the school's achievement in publicizing its commitment towards environmental management.**

**B1.1 An environmental policy is issued and publicised on the campus.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school has an environmental policy (A26).}*

**B1.2 Students, staff and parents understand and support the policy.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**B2. ENVIRONMENTAL EDUCATION COORDINATING TEAM**

**Objective: To determine the school's commitment in coordinating initiatives in environmental management and environmental education.**

**B2.1 A coordinating team in environmental education is formed in the school.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**B2.2 Leading members responsible for environmental education are appointed.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**B2.3 An implementation plan is formulated to realise the environment policy.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**B3. GREEN MANAGEMENT PRACTICE**

**Objective: To determine the extent of the school's achievement in improving school environmental quality in key areas; and its commitment in tracking its own progress for improvement.**

**B3.1 Green management is implemented in the school in the following areas.**

### (i) Waste Management

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school reuses marketing materials (D3), engages recycling contractors (D6) and sends used ink cartridges for recycling (D9), the school has an electronic-waste strategy (D10), duplex and greyscale printing options are the default computer/printer setup (D14), the school educates students about the need to reduce food wastage (D19) and takes concrete measures to reduce food wastage, such as food donation drives (D20), the school provides proper garbage separation methods (D21) and the number of containers are sufficient for the volume of garbage (D13). Our question: We would be grateful for guidance on how the Founder's Day Food Drive helps to reduce food wastage. Our observations: 1) The 2015 response to item D13 is no longer accurate today. Students have been repeatedly lectured about our poor garbage disposal habits which has resulted in overflowing brown bins outside the classrooms which both the teachers and the students have observed. 2) From our observations, students do not necessarily segregate their garbage even though there are recycling waste bins provided by the school for the purpose.}*

### (ii) Water Conservation

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school has appointed a water controller to monitor water consumption patterns through monthly utility bills (C2) and water saving taps have been installed (C5). Our question: What is done with the data collected from the monitoring of water consumption patterns? Ideas for consideration (if not already done so): use collected rainwater for onsite watering needs, instal rain gardens, berms, swales or other natural structures and vegetation to retain water onsite and minimise potable water use, use reclaimed water, immediately report leaks (Austin Independent School District, n.d.). Low-flow toilet flush (Eco-schools USA, n.d.)}*

### (iii) Energy Conservation

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that air conditioner filters are cleaned every two months (B3), the school has a routine management walk around the campus to ensure that lights are*

off (B4), power saving options are enabled for equipment (B5), the school uses solar panels, LED lightings and automatic lighting in the toilets (D4). **Our question: Do we have something like the Singapore government's OneService app in our school for reporting of all types of malfunctioning? If not, is there a need to develop one?** Ideas for consideration (if not already done so): use natural lighting when possible, task lighting instead of overhead lighting, reduce lighting in over-lit areas, use natural ventilation/windows when possible, conserve energy after school hours, immediately report inoperable occupancy life sensors (Austin Independent School District, n.d.).}

**(iv) Indoor Air Quality**

Excellent     Good     Fair     Improvement Required

Elaboration:

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{Note: In the School Green Award 2015 Report, it was reported that air conditioner filters are cleaned every two months (B3). Ideas for consideration (if not already done so): integrated pest management using natural non-polluting treatment methods, locate printers in well-ventilated areas that minimise exposure to students/staff, minimise desktop/individual printers in favour of central print stations, minimise dust and allergens, immediately report mold, asbestos and other air quality concerns (Austin Independent School District, n.d.)}

**(v) Outdoor Air Quality**

Excellent     Good     Fair     Improvement Required

Elaboration:

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{Items for consideration under this point include:

- Do an air quality audit to assess what products and practices contribute to air pollution around the school
- Calculate carbon footprint (personal, classroom, campus)
- Check if students and staff understand the relationship between local air pollution such as ground-level ozone and greenhouse gases that contribute to global climate change
- Promote green transportation options that reduce vehicle air pollution
- Encourage bus drivers/parents to not idle their engine during pick-up/drop-off. All of the above via: o education campaigns o incentives (bumper stickers, gift cards) o signage. [Note: we have observed that HCI HS has the signage on no idle engines.]
- Provide Ozone Action Day education to limit polluting activities on poor air quality days by: o forwarding email Ozone Action Day alerts to parents and staff o posting signs on Ozone Action Days?
- Optimized your pick-up/drop-off times and logistics to minimize congestion and reduce engine idling that causes air pollution
- Ensure that afterschool program administrators and community groups are encouraged to practice/promote air pollution reduction activities in line with the school's practices (Austin Independent School District, n.d.)}

**(vi) Transportation**

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school has a traffic manager for rainy weather (A29). Our question: We would be grateful to receive guidance on how having a traffic manager for rainy weather helps to green the school? Is it because less traffic jam results in less carbon emissions? Or are there any other reasons? Ideas for consideration (if not already done so): campus transportation audit, encourage students' green transportation options (e.g. cycling, taking public transport) via incentives, contests, awards, provide green transportation infrastructure (e.g. bike racks, green vehicle priority parking), offer walking/biking field trips (Austin Independent School District, n.d.).}*

**(vii) Green Purchasing**

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school has established environmental guidelines for purchases (A28), purchases environmentally friendly paper (D7) and uses environmentally-friendly and non-toxic or certified under eco-labels such as the Green label (F5). Ideas for consideration (if not already done so): using biodegradable trash bags, rechargeable batteries, have green product guidelines/standards to follow, limit the purchase of single-serve bottles and containers (Austin Independent School District, n.d.).}*

**B3.2 Environmental audits are conducted regularly by the school to assess environmental performance.**

- Excellent     Good     Fair     Improvement Required

Elaboration:

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**B3.3 An implementation report is published by the school annually.**

- Excellent     Good     Fair     Improvement Required

Elaboration:

---

**B4. ENVIRONMENTAL EDUCATION TRAINING**

**Objective: To determine the extent of the school's commitment in training teaching staff on environmental education; and training all relevant school members about the importance of practising environmental management.**

**B4.1 Environmental talks are conducted for teachers and students regularly.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

**B4.2 Teachers attend external environmental training programmes regularly.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

**B5. ENVIRONMENTAL INFORMATION DISSEMINATION**

**Objective: To determine the extent of school's commitment in sustaining school members' environmental awareness by disseminating environmental news and environmental activities information; and producing environmental reference materials.**

**B5.1 Environmental information is circulated / distributed to teachers and students or displayed around the school.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

*{Note: In the School Green Award 2015 Report, it was reported that posters are displayed in common areas to promote positive environmental behaviours (A33).}*

**B5.2 Constant effort is made to procure environmental reference materials, including books, CD-ROMs and videos, etc.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

## **C. ENVIRONMENTAL EDUCATION**

### **C1. EDUCATION THROUGH FORMAL CURRICULUM - ACTION PLAN**

**Objective: To determine the extent of the school's commitment in identifying environmental themes and conceiving a comprehensive action plan for teaching.**

**C1.1 A well-conceived action plan is compiled and cross-curricular environmental themes are identified.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

### **C2. EDUCATION THROUGH FORMAL CURRICULUM - INTEGRATION OF ENVIRONMENTAL EDUCATION**

**Objective: To determine the extent of the school's ability to incorporate environmental education in appropriate subjects.**

**C2.1 Environmental education (EE) is incorporated into appropriate subjects and reflected in respective teaching plans.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

*{Note: In the School Green Award 2015 Report, it was reported that environment education topics were incorporated into the school curriculum (A16).}*

### **C3. EDUCATION THROUGH FORMAL CURRICULUM - EDUCATION MATERIALS**

**Objective: To determine the school's competence in producing its own environmental educational materials and resource list.**

**C3.1 Special environmental education (EE) materials are produced by teachers for teaching purpose.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**C3.2 An environmental resource list of the school is available and accessible by teachers and students.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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### **C3A. EDUCATION THROUGH FORMAL CURRICULUM – TEACHING STYLE & TEACHER COMPETENCE**

**Objective: To determine the school’s competence in teaching EE in an effective way.**

#### **C3A.1 Teachers teach EE competently and effectively.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that “hands on” learning method was incorporated when teaching environmental topics (A17) and an environmental corner/hub was set up to encourage self-learning (A18). Students were also sent for training workshops/conferences etc to increase their knowledge on environmental issues (A19). It was also reported that the school has staff which specialise in environmental topics (A23). Our question on A19 of the 2015 report: It appears that not all HCI students were sent for such training? Has this changed since 2015 (i.e. are all students now sent for training)? Also, are teachers sent for training too?}*

### **C4. EDUCATION THROUGH CO-CURRICULAR ACTIVITIES - GREEN COUNCIL**

**Objective: To determine the extent of the school’s achievement in motivating students to coordinate environmental activities.**

#### **C4.1 A Green Club or equivalent is established to organize environmental education.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

*{Note: In the School Green Award 2015 Report, it was reported that the Green Council was established in 2011 to look into green issues in the school (A31 and A32). The aim of the Green Council suggested in A23 is 1) to carry out school wide environmental programmes, 2) conduct environmental learning journeys and 3) compete in green competitions. In A31 and A32, it is stated that the Green Council aims to “meet the needs of the school n terms of environmental education”. Our question: is there a need to revise the aims of the Green Council in order to achieve leading green school status under the SG Green Plan 2030? Or is*

*there a need to change or increase the activities of the Green Council in order to achieve a greater impact so that the school can achieve leading green school status under the SG Green Plan 2030?}*

## **C5. SCHOOL ACTIVITIES**

**Objective: To determine the school's commitment in planning environmental activities to involve and benefit the whole school and the parents.**

### **C5.1 The schedule and content of environmental activities are planned in each school year.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

### **C5.2 The school holds annual environmental activities.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Our question on A20 of the 2015 report: are the Green Facts Challenged and the Science Green Learning Journey annual activities? Should our PW group be looking into getting stakeholder feedback on annual activities/additional annual activities?}*

### **C5.3 The school responds to the World Environment Day and national level environment-themed activities by running thematic activities.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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### **C5.4 Students and parents are mobilized to participate in environmental activities.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that students are encouraged to recycle textbooks and stationery (A30). It was also reported that parents are involved in the school's environmental efforts (A24).}*

**C5.5 Students are incentivised to participate in environmental activities.**

- Excellent     Good     Fair     Improvement Required

Elaboration:

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**C5.6 School environmental activities are publicised, e.g. through social media to maintain visibility and to encourage participation.**

- Excellent     Good     Fair     Improvement Required

Elaboration:

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**C6. ACTIVITIES IN PARTNERSHIP WITH THE COMMUNITY & ORGANIZATIONS OF OTHER COUNTRIES**

**Objective: To determine the extent of the school's effort in partnering with the community and other parts of the world to pursue environmental education.**

**C6.1 Students and parents are provided with opportunities to organize or participate in community-based environmental activities and overseas exchange programs.**

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school has several service learning projects focussing on the environment which involve partnering with the community (A21 and A22). It was also reported that parents are involved in the school's environmental efforts (A24). Our question: does HCl HS also participate in environment-related overseas exchange programmes?}*

**D. EFFECTIVENESS OF ENVIRONMENTAL EDUCATION**

**D1. ENVIRONMENTAL AWARENESS, ATTITUDE & BEHAVIOUR**

**Objective: To determine the extent of evaluation the school undertakes to assess the change of environmental awareness, attitude and behaviour of school members.**

**D1.1 A mechanism is established to evaluate the effectiveness of environmental education programmes in formal curriculum.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**D1.2 A mechanism is established to evaluate the effectiveness of environmental education programmes in co-curricular activities.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**D1.3 The environmental awareness of teachers is enhanced.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

**D1.4 The environmental awareness of students is enhanced.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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## **D2. ENVIRONMENTAL AWARDS**

**D2.1 Environmental awards are obtained by the school/teachers/students.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that the school/its students won a total of 3 awards (F1).}*

## **E. STAKEHOLDERS' PARTICIPATION IN ENVIRONMENTAL ACTIVITIES**

## E1. PRACTICE OF ENVIRONMENTALLY-FRIENDLY MEALS

**Objective:** To determine the extent of the school’s commitment in facilitating environmentally-friendly meals.

### E1.1 Canteen stall operators adopt environmental measures in preparing, serving or purchasing food.

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Our suggestion: our takeout food from the canteen is packed in plastic and polystyrene containers. Is it possible to change to corn ware (expanding the practice stated in A28 of the School Green Award 2015 Report) and then slowly change from corn ware to BYO containers (expanding the practice stated in A28 of the 2015 report). Our question: The original aim of our project was to find a solution to the overflowing brown bins outside classrooms as a result of COVID-19 induced eating food bought from the canteen in the classrooms. So, should we focus on this aspect (solving garbage disposal problem) after the general green audit is completed? Ideas for consideration (if not already done so): give students and staff access to food grown in onsite school garden and/or via delivery from local farms, school meals should offer and encourage healthy options, canteen operators to seek to minimise the amount of food waste via proper meal planning, providing desirable food, encouraging students to take only what they think they will eat (within legal requirements), providing opportunities to take away or share leftover food (within legal requirements)}(Austin Independent School District, n.d.)}*

## E2. WASTE REDUCTION, PROMOTION OF CLEAN AIR AND CLEAN WATER AND OTHER ENVIRONMENTAL ACTIVITIES

**Objective:** To determine the extent of students’ participation in environmental activities.

### E2.1 Students participate in environmental programs and activities.

- Excellent     Good     Fair     Improvement Required

Elaboration:

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*{Note: In the School Green Award 2015 Report, it was reported that 4 green activities were held “in the period of assessment” (F2 and F3): 1) Green Facts Challenge 2015 2) Environmental Science- Science Green Learning Journey 3) HCI Founders’ Day Food Drive 4) Ecoritch trial carried out at MacRitchie Reservoir.}*

## E3. STUDENT-LED GREEN AUDITS AND REVIEWS

**Objective:** To ensure that students have “hands-on” experience and practice reflection in order to internalise the green messages.

**E3.1 Students do green audits/reviews/reflection from time to time, individually and at class, level and consortium levels.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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#### **E4. STUDENT GREEN LEADERS**

**Objective:** To determine the extent to which students take on the role as green leaders in promoting environmental protection.

**E4.1 Students participate in environmental schemes so that they are trained as leaders.**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

**E4.2 Student green leaders are empowered to 1) contribute ideas and suggestions which would motivate other students and given a small budget to do so and 2) allowed to help with publicity of school environmental activities (e.g. via social media).**

Excellent     Good     Fair     Improvement Required

Elaboration:

---

*{Our thoughts: We are thinking that the student leaders can use Instagram and Whatsapp, which appeals to people our age. Instagram allows attractive posts to be made and spread widely. As for how to motivate students, two examples: 1) Students who contribute to most to green initiatives according to peer voting could be given some reward like chocolate milk. 2) Events are planned to suit the tastes and interests of students so that they are very memorable and unique. Gimmick can be added if necessary.}*

#### **F. SUSTAINABLE DEVELOPMENT**<sup>4</sup>

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<sup>4</sup> This Section F is adapted from the Eco-Schools USA Environmental Review Checklist, n.d..

**Objective: To assist in planning beyond environmental education to education for sustainable development generally (i.e. addressing all three pillars of sustainability).**

**F1. Students consider how actions taken within the school affect people and the environment locally and globally.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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**F2. Students have an understanding of the relationship between the environment, society and economics.**

Excellent     Good     Fair     Improvement Required

Elaboration:

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## Appendix 2

### Comparison of 2015 green audit report results & results of 3 responses to our general green audit in the form of 2 tables

#### Key/Explanations

\* We compared the responses in the audit completed by Mr Lim Chuan Chia in 2015 on behalf of HCI HS and our PW 2021 green audits completed by Mr Lim (labelled 'A' in this table), Mr Low Swee Xiang (labelled 'B') and our Project Work group (labelled 'C'). We had shared our green audit with the Estate Office and have been corresponding with Mr Clement Koh, but we have not received the Estate Office's response to our green audit yet.

Our green audit is more comprehensive than the 2015 one. Hence, for several items in our green audit, there are no corresponding items in the 2015 audit. Light grey squares indicate that there was no equivalent entry in the 2015 audit.

Furthermore, there is no scoring scale in the 2015 audit. We have reflected in the table below under the section 'Responses', the score which we think most closely fits the explanations given in the 2015 audit.

\*\* E= Excellent, G=Good, F=Fair, IR = Improvement Required.

Dashes indicate that the respondent felt that he was not in a position to give an answer.

**Table 1: Comparison of scores**

QUESTIONS	RESPONDANT <sup>+</sup>	RESPONSES <sup>**</sup>			
		E	G	F	IR
A1.1 The campus is made green by growing plants.	2015				
	A				
	B				
	C				
A1.2 The plants are labelled for educational purpose.	2015				
	A				
	B				
	C				
A1.3 A corner for practising organic farming is established.	2015				
	A				
	B				
	C				
A2.1 The campus is clean and tidy.	2015				
	A				
	B				
	C				
A2.2 The classroom and office areas are clean and tidy.	2015				
	A				

		<i>B</i>			
		<i>C</i>			
A2.3 Washrooms are clean and odour-free.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
A3.1 A corner/bulletin for displaying environmental information is established.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B1.1 An environmental policy is issued and publicised on the campus.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B1.2 Students, staff and parents understand and support the policy.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B2.1 A coordinating team in environmental education is formed in the school.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B2.2 Leading members responsible for environmental education are appointed.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B2.3 An implementation plan is formulated to realise the environment policy.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B3.1 Green management is implemented in the school in the following areas.					
(i) Waste Management	2015				
	<i>A</i>	-	-	-	-
	<i>B</i>				
	<i>C</i>				
(ii) Water Conservation	2015				
	<i>A</i>	-	-	-	-
	<i>B</i>				
	<i>C</i>	-	-	-	-
(iii) Energy Conservation	2015				
	<i>A</i>	-	-	-	-
	<i>B</i>				
	<i>C</i>	-	-	-	-
(iv) Indoor Air Quality	2015				
	<i>A</i>	-	-	-	-

		<i>B</i>			
		<i>C</i>			
(v) Outdoor Air Quality	2015				
	<i>A</i>	-	-	-	-
	<i>B</i>				
	<i>C</i>				
(vi) Transportation	2015				
	<i>A</i>	-	-	-	-
	<i>B</i>				
	<i>C</i>	-	-	-	-
(vii) Green Purchasing	2015				
	<i>A</i>	-	-	-	-
	<i>B</i>				
	<i>C</i>	-	-	-	-
B3.2 Environmental audits are conducted regularly by the school to assess environmental performance.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B3.3 An implementation report is published by the school annually.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B4.1 Environmental talks are conducted for teachers and students regularly.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B4.2 Teachers attend external environmental training programmes regularly.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>	-	-	-	-
B5.1 Environmental information is circulated / distributed to teachers and students or displayed around the school.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
B5.2 Constant effort is made to procure environmental reference materials, including books, CD-ROMs and videos, etc.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
C1.1 A well-conceived action plan is compiled and cross-curricular environmental themes are identified.	2015				
	<i>A</i>				
	<i>B</i>				
	<i>C</i>				
C2.1 Environmental education (EE) is incorporated into appropriate subjects	2015				
	<i>A</i>				
	<i>B</i>				

and reflected in respective teaching plans.	C				
C3.1 Special environmental education (EE) materials are produced by teachers for teaching purpose.	2015				
	A				
	B				
	C				
C3.2 An environmental resource list of the school is available and accessible by teachers and students.	2015				
	A				
	B				
	C				
C3A.1 Teachers teach EE competently and effectively.	2015				
	A				
	B				
	C				
C4.1 A Green Club or equivalent is established to organize environmental education.	2015				
	A				
	B				
	C				
C5.1 The schedule and content of environmental activities are planned in each school year.	2015				
	A				
	B				
	C	-	-	-	-
C5.2 The school holds annual environmental activities.	2015				
	A				
	B				
	C				
C5.3 The school responds to the World Environment Day and national level environment-themed activities by running thematic activities.	2015				
	A				
	B				
	C				
C5.4 Students and parents are mobilized to participate in environmental activities.	2015				
	A				
	B				
	C				
C5.5 Students are incentivised to participate in environmental activities.	2015				
	A				
	B				
	C				
C5.6 School environmental activities are publicised, e.g. through social media to maintain visibility and to encourage participation.	2015				
	A				
	B				
	C				
	2015				

C6.1	Students and parents are provided with opportunities to organize or participate in community-based environmental activities and overseas exchange programs.	A				
		B				
		C				
D1.1	A mechanism is established to evaluate the effectiveness of environmental education programmes in formal curriculum.	2015				
		A				
		B				
		C	-	-	-	-
D1.2	A mechanism is established to evaluate the effectiveness of environmental education programmes in co-curricular activities.	2015				
		A				
		B				
		C	-	-	-	-
D1.3	The environmental awareness of teachers is enhanced.	2015				
		A				
		B				
		C	-	-	-	-
D1.4	The environmental awareness of students is enhanced.	2015				
		A				
		B				
		C				
D2.1	Environmental awards are obtained by the school/teachers/students.	2015				
		A				
		B				
		C				
E1.1	Canteen stall operators adopt environmental measures in preparing, serving or purchasing food.	2015				
		A	-	-	-	-
		B				
		C				
E2.1	Students participate in environmental programs and activities.	2015				
		A				
		B				
		C				
E3.1	Students do green audits/reviews/reflection from time to time, individually and at class, level and consortium levels.	2015				
		A				
		B				
		C				
E4.1	Students participate in environmental schemes so that they are trained as leaders.	2015				
		A				
		B				
		C				

E4.2	Student green leaders are empowered to 1) contribute ideas and suggestions which would motivate other students and given a small budget to do so and 2) allowed to help with publicity of school environmental activities (e.g. via social media).	2015				
		A				
		B				
		C	-	-	-	-
F1.	Students consider how actions taken within the school affect people and the environment locally and globally.	2015				
		A				
		B				
		C	-	-	-	-
F2.	Students have an understanding of the relationship between the environment, society and economics.	2015				
		A				
		B				
		C	-	-	-	-

**Table 2: Comparison of comments accompanying the scores**

Explanations

A dash indicates that no comment was given.

We regrouped and summarised the comments in the 2015 report because the 2015 report questions are different from the ones in our green audit. Furthermore, our green audit is more comprehensive and general. Hence, for several items in our green audit, there are no corresponding items in the 2015 audit. Alphabets followed by numbers (e.g. E3) in the comments on the 2015 audit are the references to sections and questions in the 2015 audit.

In our green audit, we had made some references to the 2015 audit. We also some questions and comments for the respondent to respond to, as we were trying to adhere to COVID-19 safe management measures by minimising contact with people outside of our class. These questions and comments are included in italics in the table below. Our questions are in red text and our comments are in blue text.

The comments of Respondents A and B were given to us at the start of Term 3 and 25 June 2021, respectively. The comments of Respondent C are as at 6 August 2021.

QUESTIONS	RESPONDANT *	COMMENTS
A1.1 The campus is made green by growing plants.	2015	It was reported that green landscaping is part of the school's design (E3).
	A	-

	B	<p>Our school has many greenery being well-maintained by a dedicated team of gardeners.</p> <p>In the design for the new Holistic Education Centre some years back the 3-4 year old building is covered with greens with air vents that enhances circulation of air as part of its design for cooling the building interiors without air con.</p> <p>Students were engaged through projects that involve improving biodiversity index of the school through planting specific types of plants/bushes/flowers that attract particular types of butterflies/insects) and the development of a biodiversity trail (by college).</p> <p>Each consortium has a dedicated plot of garden to be maintained, but the level of involvement of students to maintain is carried out to different extent.</p>
	C	HCI has integrated various plants across the school campus grounds.
A1.2 The plants are labelled for educational purpose.	2015	
	A	Some plants are labelled due to projects on greening of the school.
	B	Currently, there isn't a lot of such labelling and if there are any, there isn't any awareness created amongst the students. This can be an area of improvement for this project to consider.
	C	ProEd and iSpark garden exist, but they are not prominent and students don't necessarily know about them.
A1.3 A corner for practising organic farming is established.	2015	
	A	There is a school wide approach on organic farming. Please contact Mr Justin Loh.
	B	<p>I think our Green Council has a team who is taking care of the hydroponics growing of vegetables and for a few years, they were active in maintaining and selling the vegetables grown within the school community. Don't really see that within the last 2-3 years, probably affected by the pandemic.</p> <p>More students/farming enthusiasts can be encouraged, something to consider for this project.</p> <p>Eg. Science department is planning to set up a mini-garden with toolkits and seeds for each class to maintain within their classrooms. Whether they are "organic" in nature depends on the definition of</p>

		organic. However, more can probably be encouraged when this piloting effort takes off, to maybe have consortium level of organic/hydroponics farming.
	C	There is a greenhouse near SRC but the fact is not well known.
A2.1 The campus is clean and tidy.	2015	
	A	-
	B	The school is committed to keeping the campus clean with the help and discipline of the students with regards to their own classroom cleanliness. Regular classroom cleanliness checks is done by discipline committee staff of each consortium. A dedicated team of janitors is deployed to maintain the cleanliness of common spaces. Students are also given opportunities to clean up certain areas of the school via Class CIP for Lower secondary classes. However, as it is not in our culture for students to carry out cleaning duties of common areas together at an allocated time, similar to what we see in countries like Japan and Taiwan, this is currently the best we are managing. Perhaps the team can come up with more collective action that the student body can be engaged in to keep the campus clean?
	C	Overflowing brown bin issue, otherwise, school is kept clean.
A2.2 The classroom and office areas are clean and tidy.	2015	
	A	Classroom cleanliness kept.
	B	The office areas are largely clean with the help of a dedicated office cleaning lady and the cooperation of staff. Classroom cleanliness is largely managed by the facilities secretary of each class with much hinging on the discipline of the students in following the duty roster and on the effectiveness of the monitoring done by the form teachers. But most classrooms are clean.
	C	-
A2.3 Washrooms are clean and odour-free.	2015	
	A	-
	B	All toilets are washed twice a day and students mostly are mindful of hygiene in the washroom.
	C	We have seen: shit in toilets not flushed, for squat toilet – shit on the floor. Toilet paper pulp in the toilet water.
	2015	It was reported that the school has set-up an environmental corner/hub to encourage self-learning (A18).

A3.1	A corner/bulletin for displaying environmental information is established.	A	More information are in Green Council Instagram or Facebook.
		B	Not really observed.
		C	Nobody has introduced us to the green corner.
B1.1	An environmental policy is issued and publicised on the campus.	2015	It was reported that the school has an environmental policy (A26).
		A	-
		B	I believe there is one and the fact that Green Week is publicised and celebrated, Earth hour is kind of observed, there is a policy but maybe not reminded/published to the student body.
C	Having a policy on paper is not the same as taking action.		
B1.2	Students, staff and parents understand and support the policy.	2015	
		A	-
		B	Support from staff and student is evident, but I'm not sure about the parents and their role in understanding and supporting the policy. However, more can be done to ensure students are aware of the details in the policy for them to show greater support.
C	We have not been officially briefed on this policy.		
B2.1	A coordinating team in environmental education is formed in the school.	2015	
		A	Green Council.
		B	The Green Council is the student body in charge of this in high school. In college, there is a similar council as well. In terms of staff, there is no actual team that focus on this though, but the estate office and Mr Lim Chuan Chia, as the mentor of the Green Council, does have active interest and engagement in areas concerning environmental education. Through service learning projects, we do see ground-up initiatives from students that advocate environmental education.
C	It exists, but we are not in a position to evaluate.		
B2.2	Leading members responsible for environmental education are appointed.	2015	
		A	Green Council.
		B	Officially, maybe only Mr Lim Chuan Chia is involved at high school.
C	It exists, but we are not in a position to evaluate.		
B2.3	An implementation plan is formulated to realise the environment policy.	2015	
		A	Green Council.
		B	I am not really aware of the implementation plan. Maybe the team can look into an implementation plan that is made known to rally participation amongst the largest stakeholders in our

		school, the students, to be involved more actively.
	C	It exists, but we are not in a position to evaluate.
B3.1	Green management is implemented in the school in the following areas.	
(i) Waste Management	2015	<p>It was reported that the school reuses marketing materials (D3), engages recycling contractors (D6) and sends used ink cartridges for recycling (D9), the school has an electronic-waste strategy (D10), duplex and greyscale printing options are the default computer/printer setup (D14), the school educates students about the need to reduce food wastage (D19) and takes concrete measures to reduce food wastage, such as food donation drives (D20), the school provides proper garbage separation methods (D21) and the number of containers are sufficient for the volume of garbage (D13).</p> <p><i>Our question: We would be grateful for guidance on how the Founder's Day Food Drive helps to reduce food wastage.</i></p> <p><i>Our observations: 1) The 2015 response to item D13 is no longer accurate today. Students have been repeatedly lectured about our poor garbage disposal habits which has resulted in overflowing brown bins outside the classrooms which both the teachers and the students have observed. 2) From our observations, students do not necessarily segregate their garbage even though there are recycling waste bins provided by the school for the purpose.</i></p>
	A	Please check with Estate Office.
	B	Yes, the recycling effort has reduced greatly with the stoppage of subscription for hard copy newspapers. However, the presence of recycling bins in classrooms and the appointment of a green ambassador in each class does show the school's intent in ensuring there is a presence of Green Management in terms of waste management. Continued education, advocacy, monitoring and enforcement is needed for students to comply with regards to the plastic waste that comes with buying takeaway food from the canteen. This requires a more concerted effort from the student body who often seek convenience instead.
	C	Brown bins unable to support good disposal habits.

(ii) Water Conservation	2015	<p>It was reported that the school has appointed a water controller to monitor water consumption patterns through monthly utility bills (C2) and water saving taps have been installed (C5).</p> <p><i>Our question: What is done with the data collected from the monitoring of water consumption patterns?</i></p> <p><i>Ideas for consideration (if not already done so): use collected rainwater for onsite watering needs, instal rain gardens, berms, swales or other natural structures and vegetation to retain water onsite and minimise potable water use, use reclaimed water, immediately report leaks (Austin Independent School District, n.d.). Low-flow toilet flush (Eco-schools USA, n.d.)</i></p>
	A	Please check with Estate Office (should be excellent).
	B	We do see that the toilet flush is sometimes weaker than expected, which suggests low-flow toilet flush may have been put in place. However, clear communication of such conservation efforts has not been put in place and may require this group to proactively seek to find out and share with the school population.
	C	-
(iii) Energy Conservation	2015	<p>It was reported that air conditioner filters are cleaned every two months (B3), the school has a routine management walk around the campus to ensure that lights are off (B4), power saving options are enabled for equipment (B5), the school uses solar panels, LED lightings and automatic lighting in the toilets (D4).</p> <p><i>Our question: Do we have something like the Singapore government's OneService app in our school for reporting of all types of malfunctioning? If not, is there a need to develop one?</i></p> <p><i>Ideas for consideration (if not already done so): use natural lighting when possible, task lighting instead of overhead lighting, reduce lighting in over-lit areas, use natural ventilation/windows when possible, conserve energy after school hours, immediately report inoperable occupancy life sensors (Austin Independent School District, n.d.).</i></p>
	A	Please check with Estate Office.
	B	While there has been advice to turn on air-con only from 9am onwards, it has not been a practice adopted across the board. Institution wise, the installation of solar panels did compensate for energy

		consumption for a while, but in recent years, little has been shared about the percentage of solar energy supplied electricity that we have been relying on, out of total electricity consumption.
	C	-
(iv) Indoor Air Quality	2015	It was reported that air conditioner filters are cleaned every two months (B3). <i>Ideas for consideration (if not already done so): integrated pest management using natural non-polluting treatment methods, locate printers in well-ventilated areas that minimise exposure to students/staff, minimise desktop/individual printers in favour of central print stations, minimise dust and allergens, immediately report mold, asbestos and other air quality concerns (Austin Independent School District, n.d.).</i>
	A	Please check with Estate Office.
	B	Not really aware how often filters are replaced/cleaned, but each classroom as designated air purifiers in place in the event students/FTs decide there is a need to deploy one.
	C	School has given each class our own air purifier.
(v) Outdoor Air Quality	2015	
	A	Please check with Estate Office.
	B	My understanding is that with the amount of greenery and outdoor space available as a school, the outdoor air quality has been very good. Especially since we do have an open air carpark for parents to wait to pick up their child as well as having a separate chartered bus waiting area at the clock tower. So the advantage of open spaces/vehicle waiting spaces does help to improve outdoor air quality that could have been affected by vehicle exhaust from waiting vehicles.
	C	IEMB messages on emissions from parents' cars. <i>Ideas for consideration (if not already done so):</i> <ul style="list-style-type: none"> <li>• Do an air quality audit to assess what products and practices contribute to air pollution around the school</li> <li>• Calculate carbon footprint (personal, classroom, campus)</li> <li>• Check if students and staff understand the relationship between local air pollution such as ground-level ozone and greenhouse gases that contribute to global climate change</li> <li>• Promote green transportation options that reduce vehicle air pollution</li> <li>• Encourage bus drivers/parents to not idle their engine</li> </ul>

		<p>during pick-up/drop-off. All of the above via: o education campaigns o incentives (bumper stickers, gift cards) o signage. [Note: we have observed that HCI HS has the signage on no idle engines.] • Provide Ozone Action Day education to limit polluting activities on poor air quality days by: o forwarding email Ozone Action Day alerts to parents and staff o posting signs on Ozone Action Days? • Optimize pick-up/drop-off times and logistics to minimize congestion and reduce engine idling that causes air pollution • Ensure that afterschool program administrators and community groups are encouraged to practice/promote air pollution reduction activities in line with the school's practices (Austin Independent School District, n.d.)</p>
(vi) Transportation	2015	<p>It was reported that the school has a traffic manager for rainy weather (A29). <i>Our question: We would be grateful to receive guidance on how having a traffic manager for rainy weather helps to green the school? Is it because less traffic jam results in less carbon emissions? Or are there any other reasons?</i></p>
	A	Please check with Estate Office.
	B	<p>With the MRT station situated beside the school, the enhanced connectedness of the school within the existing public transport network has helped provide green transport options to the school population. Maybe more can indeed be done to further promote travelling modes like bikes/car-pooling, but these are harder to push as an institution, given the age profile of students in the midst of busy morning traffic and the challenges of early morning rush faced by different households.</p>
	C	IEMB messages on emissions from parents' cars. See section above for some suggested ways to address the issue.
(vii) Green Purchasing	2015	<p>It was reported that the school has established environmental guidelines for purchases (A28), purchases environmentally friendly paper (D7) and uses environmentally-friendly and non-toxic or certified under eco-labels such as the Green label (F5). <i>Ideas for consideration (if not already done so): using biodegradable trash bags, rechargeable batteries, have green product guidelines/standards to follow, limit the purchase of single-serve bottles and containers (Austin Independent School District, n.d.).</i></p>
	A	Please check with Estate Office.

	B	Difficult to ascertain or know to what extent green purchasing habits have been implemented school-wide, but the use of biodegradable/reusable products during large scale school events though encouraged, are not always evident or implemented with 100% adherence. Single use plastic products are still largely prevalent at the canteen/vending machines, although more effort should be in place to incentivise stall-owners/canteen vendors/students (largest percentage of school population) to choose reusable/biodegradable options for drinks/food packaging.
	C	-
B3.2 Environmental audits are conducted regularly by the school to assess environmental performance.	2015	
	A	-
	B	I believe this is done regularly but I have no knowledge of this.
	C	We have not been involved in any.
B3.3 An implementation report is published by the school annually.	2015	
	A	Not that I am aware of.
	B	Improvement needed not because it is not done but because we have no idea whether it is done.
	C	We have not seen any such reports.
B4.1 Environmental talks are conducted for teachers and students regularly.	2015	
	A	Green Council does this for students. But is insufficient.
	B	I believe this is done more for students than teachers, and more often than not, initiated by SL projects and relevant topics taught in subject areas and relevant current affairs issues in CCE.
	C	Nothing. Only about problems such as the misuse of the brown bins for throwing away food packages after eating in class during recess.
B4.2 Teachers attend external environmental training programmes regularly.	2015	
	A	Nil.
	B	I think this is not really an area of emphasis across the teaching staff. Not sure if there is a strong need for teachers to be regularly kept abreast with such training programmes given our limited roles in effecting regular practices related to Green plans of the school.
	C	-
B5.1 Environmental information is circulated / distributed to teachers and students or displayed around the school.	2015	It was reported that posters are displayed in common areas to promote positive environmental behaviours (A33).
	A	Through Green Council.

	B	Not very visible even if they are displayed. However, Green Week and other initiatives by Green Council as well as establishing a Green ambassador in each class does provide avenues for improvement in this area.
	C	We don't think any exist. There are only posters in the toilets asking us to aim properly.
B5.2 Constant effort is made to procure environmental reference materials, including books, CD-ROMs and videos, etc.	2015	
	A	Nil.
	B	This may be a little outdated given CD-ROMs are no longer that widely used and most resources/reference materials tend to be made available in soft copies in online platforms. Nevertheless, such online platforms with resources for our students should be made known clearly for the school population to access whenever necessary. Green Council can play a more proactive role in publicising these resources on official school message boards.
	C	Don't have.
C1.1 A well-conceived action plan is compiled and cross-curricular environmental themes are identified.	2015	
	A	Green concepts are weaved into the curriculum.
	B	I don't think there is a concrete action plan, but subject areas do highlight the topics where environmental themes are relevant and can be emphasized. Eg. Air Pollution in Sec 3 Chemistry syllabus.
	C	No plan.
C2.1 Environmental education (EE) is incorporated into appropriate subjects and reflected in respective teaching plans.	2015	It was reported that environment education topics were incorporated into the school curriculum (A16).
	A	Geography.
	B	Yes, environmental education is included in each subject's scheme of work where relevant topics involving environmental education are involved.
	C	Maybe in Geography to a very small extent, not the core focus.
C3.1 Special environmental education (EE) materials are produced by teachers for teaching purpose.	2015	
	A	-
	B	Teachers tend to find their own resources and pool them together into a coherent lesson plan themselves. Sharing via the department/subject scheme of work is done.
	C	No.
	2015	

C3.2	An environmental resource list of the school is available and accessible by teachers and students.	A	-
		B	Not aware of this provision.
		C	Not that we know of.
C3A.1	Teachers teach EE competently and effectively.	2015	It was reported that “hands on” learning method was incorporated when teaching environmental topics (A17) and an environmental corner/hub was set up to encourage self-learning (A18). Students were also sent for training workshops/conferences etc to increase their knowledge on environmental issues (A19). It was also reported that the school has staff which specialise in environmental topics (A23). <i>Our question on A19 of the 2015 report: It appears that not all HCI students were sent for such training? Has this changed since 2015 (i.e. are all students now sent for training)? Also, are teachers sent for training too?</i>
		A	-
		B	Difficult to ascertain the competency of every teacher in EE, not aware about specialisation in environmental topics in High School. Not possible to send all students to training workshops or conferences, but for SL projects going into this area, where there are opportunities to attend such workshops, there will be recommendations for them to attend.
		C	We don’t have EE. If anything, just school rules and warnings.
C4.1	A Green Club or equivalent is established to organize environmental education.	2015	It was reported that the Green Council was established in 2011 to look into green issues in the school (A31 and A32). The aim of the Green Council suggested in A23 is 1) to carry out school wide environmental programmes, 2) conduct environmental learning journeys and 3) compete in green competitions. In A31 and A32, it is stated that the Green Council aims to “meet the needs of the school n terms of environmental education”. <i>Our question: is there a need to revise the aims of the Green Council in order to achieve leading green school status under the SG Green Plan 2030? Or is there a need to change or increase the activities of the Green Council in order to achieve a greater impact so that the school can achieve leading green school status under the SG Green Plan 2030?</i>
		A	-
		B	Green Council is established, rather active in recycling efforts, but regular review of

		the effectiveness of their initiatives may be necessary by a panel of staff/student representatives.
	C	There is a Green Club but the question is whether it does enough. It does some activities (e.g. green week on IEMB) but very little useful outreach effort.
C5.1 The schedule and content of environmental activities are planned in each school year.	2015	
	A	Needs more events.
	B	Green Week, topics related to Environmental Education are scheduled.
	C	-
C5.2 The school holds annual environmental activities.	2015	<i>Our question on A20 of the 2015 report: are the Green Facts Challenge and the Science Green Learning Journey annual activities? Should our PW group be looking into getting stakeholder feedback on annual activities/additional annual activities?</i>
	A	Green Week.
	B	The only one/two that I am aware of are the Green Week and Earth hour.
	C	There is Green Week but nobody cares.
C5.3 The school responds to the World Environment Day and national level environment-themed activities by running thematic activities.	2015	
	A	-
	B	Earth Hour and Green Week typically ties in with national level environment-themed activities.
	C	There is Green Week but nobody cares.
C5.4 Students and parents are mobilized to participate in environmental activities.	2015	It was reported that students are encouraged to recycle textbooks and stationery (A30). It was also reported that parents are involved in the school's environmental efforts (A24).
	A	Parents are not mobilised.
	B	Both Green Council, VIA Council are involved in this to motivate and mobilise students.
	C	Only Green Council and PSG involved. Normal students not mobilised.
C5.5 Students are incentivised to participate in environmental activities.	2015	
	A	Green Quiz.
	B	Some incentives for recycling efforts as a class-based competition/scoring.
	C	Nope.
C5.6 School environmental activities are publicised, e.g. through social media to	2015	
	A	Green Council.

maintain visibility and to encourage participation.	B	Green Council activities for class-based recycling efforts were disseminated largely via Green ambassador but there are also school-wide initiatives like green week or shoe donation drive (by VIA council) that were publicised via level assemblies/iEMB. Not sure about social media.
	C	Green Council has an Instagram account. We checked it on 6/8/21 at 10.41 am. The account had 463 followers at that time, out of approximately 1716 HCI HS students. But the Green Club can publicise its Insta to the whole school.
C6.1 Students and parents are provided with opportunities to organize or participate in community-based environmental activities and overseas exchange programs.	2015	It was reported that the school has several service learning projects focussing on the environment which involve partnering with the community (A21 and A22). It was also reported that parents are involved in the school's environmental efforts (A24).
	A	We do have green service learning projects.
	B	Largely students, via SL projects, Green Council and VIA council. No overseas exchange programs.
	C	No.
D1.1 A mechanism is established to evaluate the effectiveness of environmental education programmes in formal curriculum.	2015	
	A	None.
	B	Not sure if we have this.
D1.2 A mechanism is established to evaluate the effectiveness of environmental education programmes in co-curricular activities.	2015	
	A	None.
	B	Don't think we have this.
D1.3 The environmental awareness of teachers is enhanced.	2015	
	A	None.
	B	Through CCE lesson preparation/Level assembly sharing
D1.4 The environmental awareness of students is enhanced.	2015	
	A	-
	B	A lot of room provided for students to champion and participate in student initiated environmental causes.
D2.1 Environmental awards are obtained by the school/teachers/students.	2015	It was reported that the school/its students won a total of 3 awards (F1).
	A	-
	B	Scientific research projects were often recognised in national/international level

		competitions like Singapore Junior Water Prize and SSEF. Not sure about other types of awards.
	C	The ProEd AURA awards take into account the number of demerit points and cleanliness. There is nothing on the environment.
E1.1 Canteen stall operators adopt environmental measures in preparing, serving or purchasing food.	2015	<p><i>Our suggestion: our takeout food from the canteen is packed in plastic and polystyrene containers. Is it possible to change to corn ware (expanding the practice stated in A28 of the School Green Award 2015 Report) and then slowly change from corn ware to BYO containers (expanding the practice stated in A28 of the 2015 report).</i></p> <p><i>Our question: The original aim of our project was to find a solution to the overflowing brown bins outside classrooms as a result of COVID-19 induced eating food bought from the canteen in the classrooms. So, should we focus on this aspect (solving garbage disposal problem) after the general green audit is completed?</i></p> <p><i>Ideas for consideration (if not already done so): give students and staff access to food grown in onsite school garden and/or via delivery from local farms, school meals should offer and encourage sustainable food options, canteen operators to seek to minimise the amount of food waste via proper meal planning, providing desirable food, encouraging students to take only what they think they will eat (within legal requirements), providing opportunities to takeaway or share leftover food (within legal requirements)(Austin Independent School District, n.d.)</i></p>
	A	Check with Estate Office.
	B	Limited adoption in providing biodegradable food packaging.
	C	The vendors use plastic (purple) plates and polystyrene packages. In early August 2021, they change to cardboard boxes and canvas packaging but switched back to their usual 2-3 days later.
E2.1 Students participate in environmental programs and activities.	2015	It was reported that 4 green activities were held “in the period of assessment” (F2 and F3): 1) Green Facts Challenge 2015 2) Environmental Science- Science Green Learning Journey 3) HCI Founders’ Day Food Drive 4) Ecoritch trial carried out at MacRitchie Reservoir.
	A	-

	B	Participation rate is largely bumped up via class-based recycling bins. However, actual dedicated, committed and sustained participation is hard to assess.
	C	Students too busy to care.
E3.1 Students do green audits/reviews/reflection from time to time, individually and at class, level and consortium levels.	2015	
	A	-
	B	Only SL Projects like this one and possible Green Council will do this.
	C	No.
E4.1 Students participate in environmental schemes so that they are trained as leaders.	2015	
	A	Green Council.
	B	This is one possible leadership platforms for students to undertake across all 4 levels, the Green Council.
	C	Normal students not involved. Just Green Council.
E4.2 Student green leaders are empowered to 1) contribute ideas and suggestions which would motivate other students and given a small budget to do so and 2) allowed to help with publicity of school environmental activities (e.g. via social media).	2015	
	A	Green Council.
	B	Yes, Green Council are empowered to do so.
	C	<i>Our thoughts (as shared in our green audit): We are thinking that the student leaders can use Instagram and Whatsapp, which appeals to people our age. Instagram allows attractive posts to be made and spread widely. As for how to motivate students, two examples: 1) Students who contribute to most to green initiatives according to peer voting could be given some reward like chocolate milk. 2) Events are planned to suit the tastes and interests of students so that they are very memorable and unique. Gimmick can be added if necessary.</i>
F1. Students consider how actions taken within the school affect people and the environment locally and globally.	2015	
	A	-
	B	Yes, annually there are student-initiated projects that attempt to do environmental education. However, actual change in habits of the overall school population may be hard to qualify/quantify.
	C	-
F2. Students have an understanding of the relationship between the environment, society and economics.	2015	
	A	-
	B	Yes, via academic and current affairs discussion.
	C	-

## Appendix 3

### Educational posters

We sought feedback on our draft educational posters in person (where possible), via an online survey and also by reaching out through social media to our contacts. We asked our contacts to reach out to their contacts too and give us consolidated replies. We estimate that we reached out to a total of 30-35 students in HCI HS from all levels.

The the explanatory notes that we used when approaching students are as follows:

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#### Cat. 4 Project Work - PROJECT CHANGE

- We are making posters to try to discourage students from simply throwing rubbish into the brown bins outside the classroom. We have drafts of three types:
  - Type 1: appeal to HCI students' positive values and attributes (**POSTER 1**).
  - Type 2: show HCO students the negative effects of simply throwing rubbish into the brown bins (**POSTERS 2a & 2b**).
  - Type 3: mostly informative/educational (**POSTER 3**).
- Please give us your feedback on these 3 draft posters:
  - What do you like/dislike about them?
  - How might we make the poster effective (or more effective) in making you throw rubbish into the brown bins more responsibly?
- Thank you very much!

*Please see*

*Annex 1: POSTER 1*

*Annex 2: POSTERS 2a & 2b*

*Annex 3: POSTER 3*

\*\*\*\*\*

Some feedback that we received include the following:

Poster 1



Poster 2a



Poster 2b



Poster 3



*“Err for poster 1: The first picture seems a bit irrelevant 2nd one is good as it shows the outcome. 3rd one is alright \*Maybe add some infographic elements and what not to make it look more appealing. Poster 2: If I am being honest, posters 2a and 2b are disgusting, and do not effectively serve the purpose of telling students to throw their trash in big bins. It brings out the same effect of a graffiti artist spraying DO NOT ENTER at the entrance of a dilapidated building. Poster 3: I think it's good that you are going in the direction of warning, but this doesn't really apply to school, does it? Overall, i think the posters should have 3 main things: 1. Visual appeal and not like that zombie rat 2. Informative 3. Serves as a warning for students not to by including disciplinary action or any other deterrent.”*

*“idt ppl would want to read the posters after seeing so many cockroaches, and u can't just put some random pics. put some catchy phrases oso”*

*“For posters: It looks quite bland cos it's just pics and words. Second one insects is damn disgusting and the rat is a huge no no. Last one is pretty interesting.”*

*“the next guy says the cockroaches are disgusting n the rest just needs a bit of decoration since white background kinda weird”*

None of the respondents liked either Poster 2a or 2b. Respondents seemed receptive to Posters 1 and 3. Among the students who were willing to identify which level they were studying in, it seemed like Poster 1 appealed to more lower secondary students while the upper secondary students appreciated Poster 4. Overall, more students seemed to prefer Poster 4 over Poster 1, though Poster 1 appeared to be a close second. Students of all levels said that the posters should be **informative**. They also suggested posters which **catches their attention** because they are **visually appealing** or have **interesting words or phrases**.

Based on the feedback we received, we worked on the design of Poster 3, seeking the targeted feedback from 4 Secondary 4 students as we did so.

Our revised Poster 3 is set out Figure 1 below.

IT IS **ILLEGAL** TO LEAVE RUBBISH ON OR AROUND A RUBBISH BIN!



Littering, as defined under section 17 of the Environmental Public Health Act of Singapore (EPHA), is depositing, dropping, placing or throwing any article or thing in any public place except in a dustbin provided for the deposit of rubbish.

If you commit a littering offence under the EPHA, you may be arrested without a warrant by any police officer or authorised officer and taken before the courts or served with a notice to attend court at a particular time.

Source of information:  
<https://singaporelegaladvice.com/law-articles/littering-killer-litter-offences-penalties-singapore/>

**LET'S LEARN TO BE LAW-ABIDING  
BY PRACTICING GOOD WASTE DISPOSAL  
HABITS AT SCHOOL:  
USE OUR BROWN BINS PROPERLY!**



**TOGETHER, WE KEEP OUR SCHOOL  
CLEAN FOR ALL.**

Figure 1. Our revised Poster 3 incorporating user feedback.

## Appendix 8

### Green activities

We sought feedback on our proposed green activities by engaging students one by one in person where possible or via social media. We did not conduct any online survey as we did for the draft educational posters, as we wanted to be able to explain the activities to respondents when explanations were needed.

We reached out to a total of 12 students in HCI HS from all levels.

The explanatory notes that we used when approaching students are as follows:

\*\*\*\*\*

Please give us your feedback on these three initiatives that we are proposing to the Green Council/consortium Student Council:

- Do you think students (in particular Secondary 1 students) will find this activity interesting and beneficial?
  - How might we improve on it?
  - What other activities would you like to participate in?
- 

Some feedback that we received include the following:

*“ok so activity number one:*

*1. Are yall planning to do this for all levels? I think it shd be okay to limit it to only one level as the trash bags and logistics required would result in contradiction of yall "going green"*

*2. Students would almost definitely not throw their trash in the bags. It would make them look like karang guni carrying a bag of shit around*

*3. Collecting food waste is not hygienic especially during this period*

*\*Maybe yall can talk about installing those food compost makers if you wanna go green”*

*“Activity No.2: Is there really a need for time limit or can it just be over the course of a week?”*

*“Activity 3: Don't think students, especially sec 3 onwards, will be interested as it seems rudimentary. This makes them seem as if we are looking down on them as probably know about all the stuff stated there alr”*

*“the activities kinda kool i guess, unique.”*

Based on the feedback we received, we adjusted the activities **introduce some variations to differentiate between lower secondary and upper secondary students** and to **be more practical** (e.g. take into account the COVID-19 situation). We sought the targeted feedback from a group of Secondary 4 students involved in the Green Council activities and consortium Student Council when we were making the adjustments.

Our adjusted green activities are set out in Figures 1 to 3 below.

## **ACTIVITY #1 CLASS-BASED ACTIVITY FOR SEC 1s POST-ORIENTATION: How Much Trash Do You Make in One Day?**

Students will begin to become more aware of how much trash they generate in daily life by observing and recording how much trash they produce in one day.

Students will become conscious of what type of materials they throw away.

TIME: 45 minutes for introduction and 20 minutes for wrap-up discussion. Activity is spread over the course of one or more days.

SUPPLIES: One trash bag/student, one Ziplock bag/student (for food waste), scales, copies of a waste record worksheet for each student.

*[Note: until the COVID-19 situation stabilises, do not ask students to collect food waste. Ziplock bags will not be needed if food waste is not to be collected]*

Give a short presentation about how much waste Singapore generates and how Semakau landfill is fast running out of space.

Get students to think about waste by holding a classroom discussion. Ask students: What is waste? What types of things get thrown away? What material do you think gets thrown away the most? What happens to the trash that we throw away? Where does it go? How many pounds of trash do you think you produce each day?

Explain that the next day the students will be keeping track of the waste items they would normally throw away.

*[Variation 1: If food waste is NOT to be collected]*

Distribute trash bags to students. All items that would be trash will be put into the trash bag. Also distribute waste record worksheets and have students write down an estimate of how much waste they think they will have at the end of the day.

*[Variation 2: If food waste is to be collected]*

Distribute trash bags and Ziplock bags to students. All items that would be trash will be put into the trash bag. Any food waste should be put in the Ziplock bag and sealed. Also distribute waste record worksheets and have students write down an estimate of how much waste they think they will have at the end of the day.

Following the trash collection day have students weigh their trash bags, record the results of materials, and dispose of the waste in the proper containers.

Hold a class discussion on what the student's learned through this process. Use this discussion to begin talking about changes or ideas the students have to reduce waste at the school.

Source: Adapted from "Strategies For Waste Reduction Projects In Schools": A Resource Guide for Educators, n.d..

**ACTIVITY #2 SEC 1 ORIENTATION - CONSORTIUM-BASED COMPETITION: Bookmark Design Competition With a Recycling Focus**

Students will engage in a discussion of waste and recycling through a story, followed by a discussion, and a creative competition.

SUPPLIES: softcopies of bookmark templates, crayons, markers, etc, Prior to activity choose a story, book, or novel that fits the Sec 1 Orientation theme for the year.

Share story/book/novel with the Sec 1s.

After sharing hold a discussion on the topic of waste and recycling.

Start by asking the Sec 1 students “What does recycling mean to you?” Further the discussion by asking them “Why is it important to recycle?”

At the end of the sharing session, tell the students that they can participate in a bookmark design challenge to help inform the school about recycling. The competition will be open throughout the orientation period and entries will be accepted until X time on Y date (*state cut-off day and time*). Tell them where template bookmarks can be downloaded and tell them the prizes (*e.g. points for the whole class, small gifts for the individual winner*).

After everyone has turned in their entries have students vote on three favorite designs to be turned into bookmarks for the school. Announce the results at consortium assembly or a Green Council activity and award prizes/points.

Source: Adapted from “Strategies For Waste Reduction Projects In Schools”: A Resource Guide for Educators, n.d..

**Figure 2. Revised educational activity 2**

**ACTIVITY #3 LEVEL OR SCHOOL-WIDE ACTIVITY TO HELP REDUCE THE POOR GARBAGE DISPOSAL PROBLEM: Re-Label and Re-Locate Day**

Engage students in conversations about waste by examining the placement of rubbish bins and recycling bins throughout the school.

For upper secondary school students, ask them for proposed solutions and ask how the plan to be part of the proposed solution or help to execute it. Allocate prizes or recognition for solutions that are proven to be effective.

For lower secondary school students, proposed the following activity for them to do or ask them if they have alternatives that they prefer to execute.

Have students take action and re-label bins to connect landfill waste to trash cans.

TIME: 30-45 minutes or more.

SUPPLIES: Bin labels (bought or self-made), access to school waste and recycling bins.

Get the conversation going by holding up pictures of the classroom wastepaper basket, brown rubbish bin, big green garbage bin and the recycling bins. Asking students if they know which bin is for paper, plastic, etc. Ask students the question “where does the garbage go?” and explain that waste gets sent to the landfill. Explain that people often forget that their garbage has to go somewhere. State that from now on their class will call the class wastepaper basket the landfill bin. This helps remind the class that waste doesn’t disappear when thrown away. Quickly survey the students and ask them how they think the school is doing on recycling. Could the class be doing more to recycle? Discuss with students ways to increase the contents of the recycling bin and decrease the contents of the landfill bin. Take one or more of their ideas and put them into action!

Some ideas

- Don’t have enough recycling bins? Turn any trash bin or unused box into a brand-new recycling bin.
- Use a garbage compactor to help increase the amount of trash the wastepaper basket can hold so that fewer plastic liners are used.
- Dispose of trash in the class wastepaper basket less and less as students learn more to demonstrate how they are decreasing the amount of waste generated.

Source: Adapted from “Strategies For Waste Reduction Projects In Schools”: A Resource Guide for Educators, n.d..

Figure 3. Revised educational activity 3

## Appendix 9

### Development and testing of our garbage compactor prototype (including user feedback)

#### Some existing solutions



Figure 1. An example of a simple manual garbage compactor. It is sold by a company called Tamp-It.



Figure 2. A foot-operated garbage compactor called the Armstrong Bin, designed by Sukwon and Sungwoo Park.



Figure 3. Joseph & Joseph's Titan garbage compactor.

#### Problems with existing solutions

The problem with the existing resources in the market that we researched is that the cheaper ones may result in additional work for the cleaners if the compactor itself has to be cleaned or if the garbage bag liner bursts or tears when the compactor is used. Existing solutions which address these problems are too costly to purchase for use throughout our school.

#### Our design process

We explored some ways to improve on existing designs by observing our surroundings, searching the Internet for inspiration from different types of products such as vases and other containers. We did not

limit ourselves to garbage compactors. We made sketches of ideas we had Figure 4 below shows some of our early sketches.

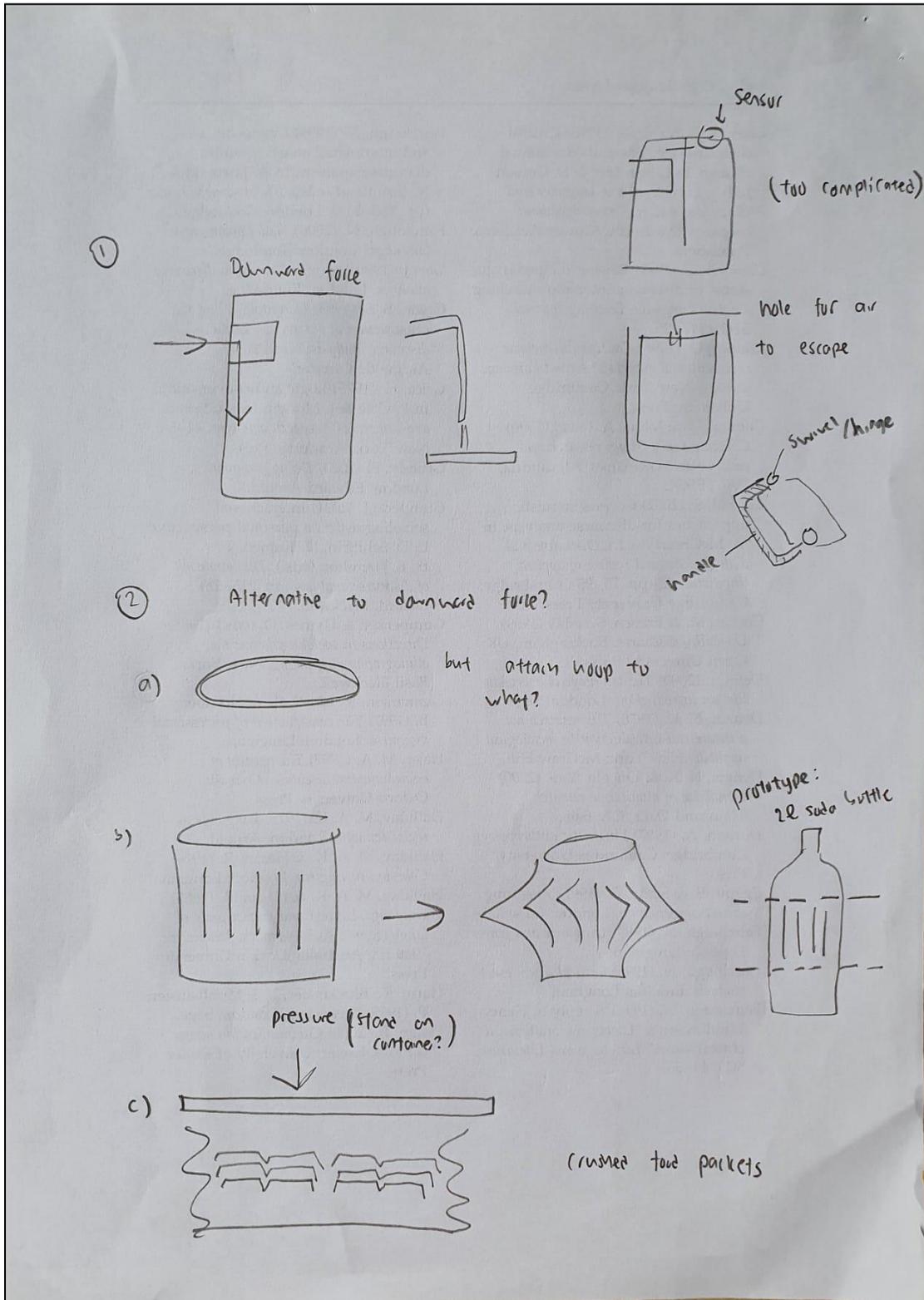


Figure 4. Sample of some of early sketches on design ideas for our garbage compactor.

We refined, added to or changed our sketches when we developed our ideas; examples are shown in Figures 5 and 6 below.

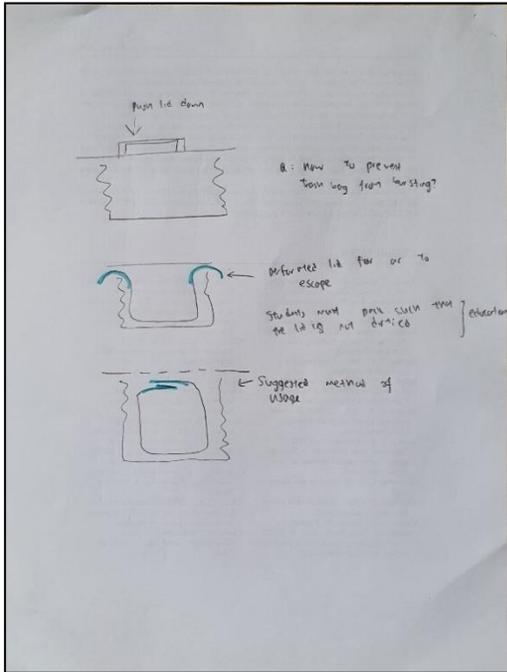


Figure 5. Sketches showing how we tried to solve problem of garbage bin liner bursting and compactor getting dirtied when using existing solutions.

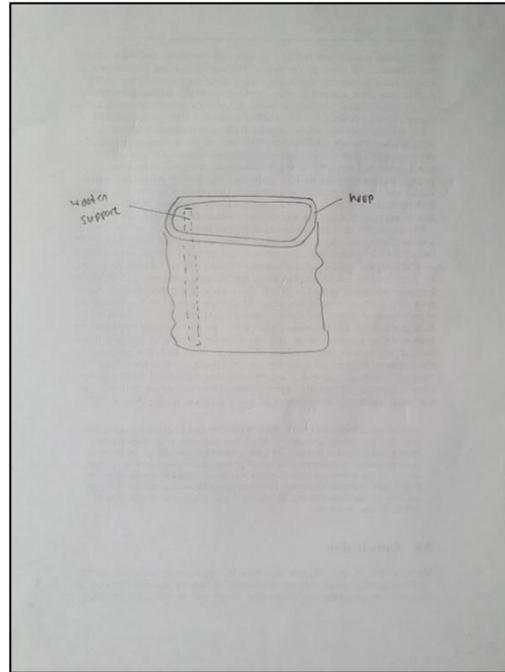


Figure 6. Sketch showing how we tried to develop our product after solving the problem bursting garbage bin liner and dirty compactor.

When constructing our actual prototypes, we used materials that we had easy access to such household items (plastic pail, plastic tray, canvas laundry basket) and normal stationery items such as cardboard and masking tape. We also purchased some cheap items from Daiso to experiment with. Figure 7 below show aspects of the construction process.

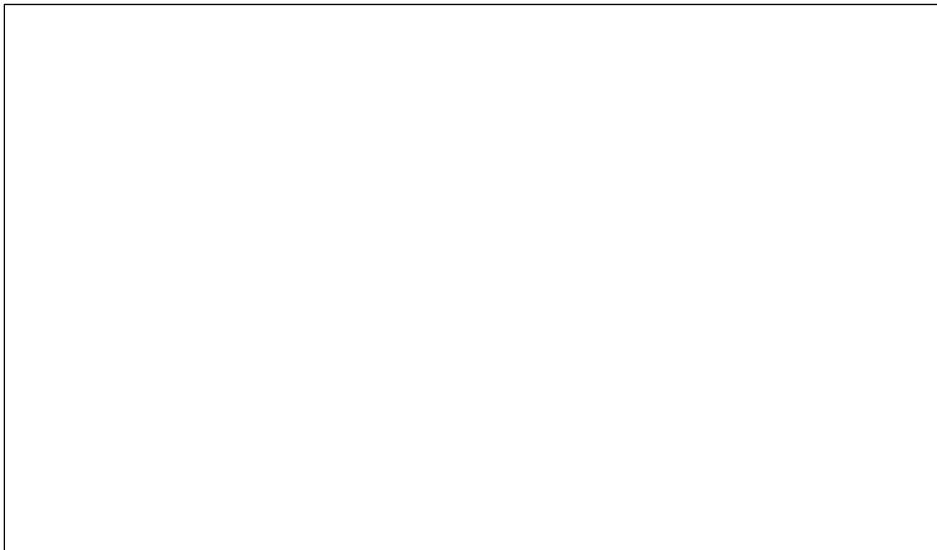




Figure 7. We bought a \$2 hoop from Daiso for clipping plastic bags in order to explore how we could stabilise the top of our prototype garbage compactor which we would compress like the Armstrong Bin using arm power (instead of leg power) and without causing the garbage bin liner inside to burst or the compacting mechanism to get dirty.

We made two different prototypes: a simple manual garbage compactor which is cheaper than existing options and an accordion-style garbage compactor, as shown in Figures 8 and 9 below.



Figure 8. Simple manual garbage compactor



Figure 9. Accordion-style garbage compactor.

We conducted two test iterations per prototype in order to finalise our choice of product design.

Simple manual garbage compactor

Test iteration: 1	Tick	Remarks
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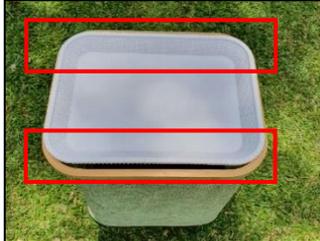
Item tested: Prototype of simple manual compactor, tested at home.				
<b>Test Date</b> 26 June 2021	<b>Pass</b>	<b>Fail</b>	<b>Potential Failure</b>	
<b>Test Criteria</b> Ability to crush trash normally thrown into wastepaper baskets			√	This is the simplest form of manual compactor. It could compact paper and cardboard packages. However, we could not find a satisfactory way to keep the compactor head (the part which comes into contact with the rubbish clean). It is too small to compact rubbish effectively when used with a garbage bin liner. And, sometime, the garbage bin liner bursts. If we cannot solve this problem, then we cannot develop the idea of this prototype further.

<b>Test iteration: 2</b> Item tested: Revised prototype of simple manual compactor, tested in the 4P1 classroom	<b>Tick</b>			<b>Remarks (including feedback from users who tested the prototype in our classroom)</b>
<b>Test Date</b> 6 August 2021	<b>Pass</b>	<b>Fail</b>	<b>Potential Failure</b>	
<b>Test Criteria</b> Ability to crush trash normally thrown into wastepaper baskets		√		We resized the compactor head then took our revised prototype to the 4P1 classroom to test and to gather some user feedback. Our observations: a) The handle is too short, so students bend their backs too much. b) The compactor head (compression surface) is now the wrong size and does not fit the school wastepaper basket (please see Figure 10 below).

				 <p><b>Figure 10. Design flaw in compression surface.</b></p> <p>c) A new problem arose. The size of the top and bottom of the school wastepaper basket is different, making the compressor even more inefficient than it was during our first test iteration.</p> <p>d) It does not work efficiently enough to justify the school having to buy new cylindrical wastepaper baskets with similarly sized top and bottom.</p> <p>Users also gave feedback that our accordian-style compactor is preferable (please see below for details of their comments).</p>
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Accordian-style garbage compactor

<b>Test iteration: 1</b> Item tested: Prototype of accordian-style compactor, tested at home	<b>Tick</b>			<b>Remarks</b>
<b>Test Date</b> 26 June 2021	<b>Pass</b>	<b>Fail</b>	<b>Potential Failure</b>	
<b>Test Criteria</b> Ability to hold a regular sized black garbage bag and crush all the trash evenly without	✓			The black trash bag does not burst because there is a gap between the edges of the body of the device and its lid (Figure 11 below).

<p>trash bag bursting and without compactor coming into contact with the rubbish</p>				 <p><b>Figure 11. Gap (highlighted in red) between body of device and lid.</b></p> <p>When the black trash bag is filled with rubbish, the top must be folded such that the rubbish does not touch the lid (Figure 12 below).</p>  <p><b>Figure 12. Garbage bag folded (but not sealed) so that lid does not touch garbage.</b></p> <p>With these 2 features, (gaps and properly folded trash bag) the device works well (Figures 13 &amp; 14 below).</p>  <p><b>Figure 13. Removable internal wooden supports are taken out in preparation for compression.</b></p>  <p><b>Figure 14. Lid is put on top of device and arm power is used to press down to compress body of device and garbage inside.</b></p>
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<p>Test iteration: 2 Item tested: Prototype of simple manual compactor, tested in the 4P1 classroom</p>	<p>Tick</p>	<p>Remarks (including feedback from users who tested the prototype in our classroom)</p>
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Test Date 6 August 2021	Pass	Fail	Potential Failure	
Test Criteria Ability to hold a regular sized black garbage bag and crush all the trash evenly without trash bag bursting and without compactor coming into contact with the rubbish	√			The device worked just as well in our classroom as it did when we tried it out at home. It works even when used in a hurry and on the go.  

A comparison of our accordian-style compactor against existing solutions using the problem evaluation grid (Decision Matrix) is as follows:

Considerations for Selection	Simple manual garbage compactor such as Tamp-It	Armstrong Bin	Joseph & Joseph Titan	Our idea (accordian-style compactor)
#1 Affordability (Most affordable = 3)	2	1	1	3
#2 Feasibility of providing resource to all classes at all levels (Most feasible =3)	1	1	1	3
#3 Usefulness to target users (Most useful =3)	1	3	3	2
#5 Purpose fulfilment (Most effective =3)	1	2	3	2
#6 Ease in use (Easiest to use =3)	2	2	3	3
<b>Total Score</b>	<b>7</b>	<b>9</b>	<b>11</b>	<b>13</b>

Note:

The matrix is based on a range of scores from 1-3, with 3 being the best, followed by 2 and then 1.