

# Hwa Chong Institution

## Project Work

### Category 3 Inventions Log Book

Title of Project: Homework Scanner
Group Name: Homework Scanner
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# 1. Problem Finding

## Our problem finding process.

We have identified 3 problems. Firstly, we felt that many people woke up not having enough time to make their own coffee. We wanted to solve this problem, but we realised it did not meet our criteria as it would not be useful to everyone, only people who drink coffee in the morning. Second, we wanted to work on the problem with many water bottle spills, specifically in our class. However, it also did not meet our criteria as many people had done it before. Finally, we decided to work on the problem of teachers spending too much time collecting homework and identifying those who have not handed the homework in. (criteria will be stated below)

Before choosing the problem we were going to solve, we had to take into account some considerations: the feasibility of the solution, whether it has been done before and finally, how useful it will be and to how many people.

Here's a table to conclude this page.

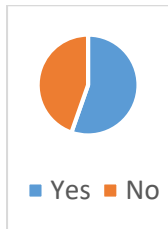
Problem	The teachers spending a lot of time collecting homework and identifying those who have not handed in	People waking up and not having enough time to make their own coffee	A lot of water bottle spills
Considerations			
Feasibility of solution	Coding software and wooden cabinet <b>+1 point</b>	Coffee machine and wire to be connected to alarm clock <b>+1 point</b>	Metal case to hold bottle and clip to be clipped to table <b>+1 point</b>
Whether it has been done before	Checked on project work archives and most shopping websites <b>+1 point</b>	Checked on project work archives and most shopping websites <b>+1 point</b>	Students have done it before in the project work archives and it has appeared on many shopping websites <b>No points</b>
How useful it will be to how many people	Done a survey across 100+ students, will be shown in next slide <b>+1 point</b>	Only useful to some students, only those who drink coffee(not many) <b>No points</b>	Useful to most classes <b>+1 point</b>
Total	<b>3 points</b>	<b>2 points</b>	<b>2 points</b>

## 2. Defining the Problem

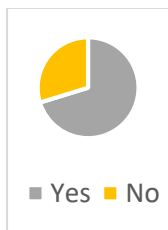
**Based on some data collected and comparison with similar solutions, we will define the problem.**

We did a survey across 121 Primary and Secondary students, and gained great results:

Do the teachers or subject reps spend a lot of time collecting homework?



Do you think the teachers waste a lot of your precious time collecting homework that could have been used to teach more?



Do you think it is necessary to make something that is more efficient and can save the teachers time?(this can replace subject reps)



### **Comparing our Homework Scanner to similar solutions.**

First, the class list. This is not the most popular choice but still commonly seen to collect orders or money. In this system, students will mark their name on a class list when handing in their money or order so the teacher knows who has done the handed in. This is slow and wastes time.

Next, the subject reps. This is the most commonly used method to collect work as it is more efficient, and the teacher usually selects those who are better in their studies as they know how to control their time. However, some subject reps may use class time to identify those who didn't hand the work in, causing them to not pay attention and do worse in tests.

Finally, there's our proposed solution, the Homework Scanner. A worksheet gets slotted into it and a phone with the app(Pen to Print) installed will scan the worksheet and convert the handwritten

work to text on the phone screen. The student will then share it to the google hangouts for the teacher to copy and paste onto a text file. Then, she can convert it to an excel file.

### 3. Our “BIG IDEA”

#### Our invention.

Our invention is a cabinet which has a Student Representative’s phone in place as a scanner to scan homework slotted into the cabinet. The scanner will be able to identify the students who have handed in the homework. When it is time for students to hand in their homework, they will slot it into the cabinet. On top of the cabinet, there will be a phone in place, and through the holes at the top of the cabinet, the student will make use of a scanning app to scan the homework slotted into the cabinet one-by-one. We have drilled three different sized holes in different locations at the top of the cabinet so that phones of different types and brands can be used to scan the homework. After this, the student will send the results of the scan to the respective subject teachers in the form of students’ names via the app Google Hangouts.

#### Reason for this invention and how it benefits the user.

The purpose of our proposed invention is to allow teachers to have an easier time collecting homework by helping them to identify students who have handed in their homework. This is so that teachers can have more time to finish teaching the curriculum. In addition, teachers do not need to assign Subject Representatives to help collect homework for them and so no students will need to miss out on any lessons, since the students will only need to slot their homework into the cabinet.

#### Why and how our invention is better than other existing solutions.

As we have described in the second segment of our report, there are already existing solutions, namely the class list and the subject reps. We will present this in a graph.

	Speed	Accuracy	Trouble	Total Points
Class List	Slow, requires list to be passed around the class. No points	The students tick their name if they handed in the item. +1 point	List could be torn or crumpled while being passed around. No points	1 points
Subject Reps	Usually takes a long time unless the subject rep uses class time No points	The rep has to check the work against the register number. This is usually accurate. +1 point	It is tedious to sort the scripts. No points	1 points
Homework Scanner	Fast, takes less than a minute. +1 point	The app has not made any mistakes for all tests. +1 point	A very short wait time between scanning and sending results. +1 point	3 points

## The problems we may face during the construction of our invention.

One problem we expect to face is the opening for the work to be slot in the cabinet. This would be a problem if all the worksheets collected were slot in at the same time. However, that is not the way the worksheets should be slotted in, but rather one at a time. Another one of the problems we expect to face is the trouble of sending documents between the two different apps, one to scan the document and one to extract the name from the scanned version. We need to find a way to transfer data from the information extracting app (Pen to Print) to an excel spreadsheet so that the names of students who have handed in their work already can be recorded. This is a problem, because there are many steps involved in the process of transferring such as having to choose which platform to transfer the data to etc.. As a result, the students may need to take a long time in order to scan their homework and send the results to the teacher, defeating the purpose of our invention. The last problem we expect to face is how we can organise the results produced by the apps we propose such that the teacher can identify easily who has not handed in their homework yet. We need to think of a sorting system which can identify students' names and sort them out in excel format according to index number.

### The major milestones of our invention.

**Stage 1:** Searched for suitable apps

**Stage 2 (Monday, 25 June):** Searched for a suitable cabinet from IKEA

**Stage 3 (Wednesday, 27 June):** Installed a lock for security purposes

**Stage 4 ( Thursday, 28 June ):** Went to Makerspace and drilled a hole into the top of the cabinet

**Stage 5 ( Tuesday, 3 July ):** Took out one piece of wood and went to Makerspace to drill two other holes

**Stage 11 ( Sunday, 5 August ):** Found a way to convert a text document into an excel spreadsheet for the teacher to check against

**Stage 12 ( Friday, 10 August ):** Found a more effective way to convert the data from Google Hangouts into an excel sheet

## 4. Construction Process

### How we decided on the materials for the invention.

We had three items to decide on: the app to scan the worksheet, the cabinet and the app receiving the text.

	Accuracy	Shareability	Affordability	Speed	Total Points
Pen to Print	3	3	3	2	11
Translate Photo Free	1	3	3	2	9

FineScanner	1	1	3	1	6
Scanner	1	1	3	1	6
Scanner OCR	1	3	3	2	9

	Presence of Slot	Bulkiness	Enough space?	Is it cheap?	Lockable?	Total Points
Lixhult Cabinet	1	2	3	1	1	8
Selje Bedside table	2	3	2	1	1	9

	Easily accessible?	Easily transferrable to an Excel spreadsheet?	Easily transferrable from Pen to Print to this app?	Total Points
Google Hangouts	3	3	2	8
Google Classroom	3	1	2	6
Gmail	1	1	1	3
Whatsapp	3	2	2	7

### The considerations.

Firstly, and most importantly, we want our product to function accurately. A malfunction in the system will result in the teachers being unable to identify these students. We will thus make use of apps which are more accurate.

Secondly, we want to use the class funds to pay for the scanner. Hence, we will use cheaper resources.

Thirdly, we want our product to be efficient. We do not want to cause the teachers to wait an even longer time for our product to do its job, as that defeats its purpose.

Finally, we want the app our product makes use of to be able to transfer data to another platform. This is because there are three phases in our product: Extracting, sending the students' names to the teacher and representing that data in excel format. We need 2 different apps to extract the students' names (Pen to Print) and send it to the teacher(Google Hangouts) before the data can be converted to excel format.

### nNext, we'll show the development stages of our invention

**Stage 1:** Searched for suitable apps

**Stage 2 (Monday, 25 June):** Searched for a suitable cabinet from IKEA

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## 5. Modification and Evaluation

Test Iteration: 1	Tick			Remarks
Test Date: 10 Aug	Pass	Fail	Potential Failure	
Speed		√		Converting text to Excel takes too long
Accuracy	√			No problems
Trouble for users		√		Too many extra steps

Test Iteration: 2	Tick			Remarks
Test Date: 12 Aug	Pass	Fail	Potential Failure	
Speed	√			Minimal wait time between scanning and sending results.
Accuracy	√			No problems
Trouble for users	√			Too many extra steps

## 6. References

**These are our references.**

1. How To Compare Two Columns And List Differences In Excel?  
Retrieved from <https://www.extendoffice.com/documents/excel/3041-excel-compare-two-columns-and-list-differences.html>
2. Serendi LTD. (2018). Pen to Print - Handwriting OCR (1.13) [Mobile application software].  
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