

# Hwa Chong Institution

## Project Work

### Category 3

## Inventions Log Book

### (Revised for 2021)

Title of Project: <u>Bamboo Charcoal Face Mask</u>
Group Name: J. J. K. S. Group
Group Members:  1) <u>Jaron Foo Yingjie</u> 2) Huang Songhao 3) Jake Ying Jue Rui 4) Kayden Lim Heng Yi

#### 1. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches e.g. thematic, survey or general brainstorming etc.

**1 A Document a list of problems you have identified. Your documentation should show clearly how your group came up with the problems.**

1. The current face masks can be quite uncomfortable to wear for long hours. It would not be very breathable and would smell bad from sweat and saliva throughout the day. It causes us to feel hotter and makes it harder to breathe.
2. There can be a problem with the chemicals in the lab, in terms of the quantity of the chemicals. Sometimes, when too much of it is used, we must discard it, even though these chemicals can be quite expensive. Not only that, this can also be a waste of precious chemicals.
3. Some students/staff forget to check-in on the TraceTogether app when entering or leaving the premises. During our attendance taking, we notice that many people will need reminders to check-in to the classroom. As checking in is vital in case of contact tracing cases, it is crucial that everybody checks in.

**1 B You should have selected a problem based on some considerations. Identify and justify these considerations.**

Some of our considerations are: Importance, Probability for success and if we are experienced enough to follow through with the ideas.

The importance of the project must be considered since if it is not important, there is absolutely no use for the project to be carried out. The significance of the problem contributes to how important the project is and what benefits solving the problem gives.

Our Probability of success is important because if our chances of success is low, there is a high chance that the project won't turn out good, resulting in us being heavily penalised. For the consideration of our experiences, if we do not have enough experience to do the project, then there is no point for us to do the project. Therefore, if we choose a manageable project, there will be a higher probability of success, making this project more fruitful and letting us learn something from it.

We considered how realistic the problem was, the potential solutions and if we have the means and resources to make the prototype. Our probability of success would be greater if it is within our skills and assets, and the resources needed are not too extensive or complex.

**1 C List some problems your group would like to solve. List also the considerations for selection of problems in the evaluation grid below. Score the considerations, against the problems, with points 1 (least significant) to 4 (most significant). Sum up the total points for each problem. Identify that problem you would like to solve.**

Problem Evaluation Grid

\*add more columns and rows where necessary

Considerations for Selection	Problems		
	Bamboo charcoal face mask	Chemical Auto-Dispenser	TraceTogether Antenna
Importance (/10)	9	8	9
Probability of success (/10)	7	8	9
Is it possible for us to complete? (/10)	6	3	2
Is it already existing? No = 10, Yes = 0 (/10)	7 We found some bamboo masks, but upon further investigation, none contained bamboo charcoal	1 We found quite a few matches for the auto-dispenser	4 It is existing in the form of the TraceTogether token but you still need to scan a QR code
Score (/40)	29	22	24

## 2. Define the Problem

(This is one...)

Now that the problem has been identified. It is important to gather information on the extent of the problem and/or evaluate the usefulness of existing solutions based on *some criteria*. You may need to conduct surveys and research on existing solutions.

**2 A Extent of problem (Research and discuss the problem and write down the problem statement)**

Since many people wear disposable face masks, a lot of face masks are thrown away, hence polluting the environment. This impacts the environment and is a huge problem.

**2 B Compare and contrast the existing or similar solutions.**

There have been reusable face masks, however, the fabric used makes it quite hard to breathe, and therefore there is smell after some time, and also sweat is trapped. We used bamboo charcoal to get rid of this since it absorbs smell and moisture. Not only that, it is cost-effective and useful.

**3. Your BIG IDEA<sup>#</sup>**

(Developing the idea...)

Write down your proposed invention and why you want to do it. State also how you think your proposed invention is better.

**3 A Describe your proposed invention.**

We can develop a Bamboo Charcoal filter for face masks. Bamboo charcoal creates an amazing combination of benefits towards the environment and consumers. Bamboo charcoal is clean and sustainable, not only that, it also absorbs moisture and smell, so it will help solve the problem of the mask being stinky and uncomfortable. Bamboo charcoal can be reactivated once every 2-3 months by exposing it through sunlight, so it would not lose its effectiveness so fast.

**3 B Explain the purpose of your proposed invention and the potential benefits to users.**

Bamboo charcoal eliminates foul smells from sweat and other things such as saliva in face masks, making it more pleasant to wear. As stated above, they can be reactivated by exposing it to natural sunlight every 2-3 months, which is convenient and does not need to be done frequently. This low maintenance is helpful and will help with users that do not want to worry about its effectiveness so frequently.

**3 C In what ways would your proposed invention be different and/or better than existing solutions, if any?**

This might enable people to continue wearing the same face mask for a longer period of time, allowing it to be more pleasing to wear. This could encourage people that do not like wearing masks to wear masks. This could make mask-wearing more pleasant as many people spend a lot of time wearing masks, it could help with the current problems faced when wearing current masks. This would make mask wearing for many hours on a daily basis more bearable.

**3 D What are some problems you expect in the course of your proposed invention?**

- Finding a way to combine bamboo charcoal with the filter
- Finding a suitable material for the mask
- Trying to keep the bamboo charcoal spread out throughout the filter
- to prevent the bamboo charcoal from seeping out

**3 E What and when are the major milestones (project timeline) in your invention?**

- The major milestones are/were:
- when we decided on the idea of bamboo charcoal masks and were able to get a mentor.
- During project evaluation, we received comments from the teachers that helped us to improve. By listening to the feedback, it allowed us to develop our project further.
- the process of making a prototype.

***#must be able to be constructed based on current / emerging technologies, must not violate the laws of Science or go against the laws of nature.***

**4. Proposed Construction or Modelling Process\***

(This first... then that...)

You are now onto the fabrication of your prototype/ product. You need to select material and understand how to put them together so that your prototype/ product can perform its function.

**4 A Explain how and why the materials were chosen for the prototype/ product of your invention.**

Bamboo charcoal has many benefits towards the environment and consumers. Bamboo charcoal is clean, sustainable, reliable and it absorbs smell and moisture.

**4 B Explore these considerations that may guide the construction of your prototype/ product.**

We must make sure the “bag” that we use to hold the bamboo charcoal powder must not have any holes which will let the powder seep out, yet it must let air and moisture go through. We must also make the powder spread evenly and not be all clumped up at the bottom of the bag due to gravity, thus it can cover as much area of the mask as possible.

4 C Propose how the prototype/ product will be constructed or developed. You may use drawings and photographs.

## Prototype- 1<sup>st</sup> mask



The bamboo charcoal pack, attempt 1



Bamboo charcoal pack, attempt 2



The bamboo charcoal pack fit inside the government provided mask.

Our trial of the mask prototype.



We purchased some bamboo charcoal, a filter and a regular face mask. We put some of the bamboo charcoal into the bag, coiled it up and put it into the mask. Then, we wore the mask for 2 hours as a trial.

## Our revised prototype of our invention



Left: We put the powder into the filter

Right: Top view of the powder in the filter



Right: Side view of the powder in the filter



Left: Placing of the powder into the filter

Right: Finished prototype



We purchased another filter and reused the face mask. We put some of the bamboo charcoal into the filter and put it into the mask. We wore the mask again as a trial.

**Warning:**

- *Video / animated simulation only if prototyping is absolutely no possible.*
- *Video / animated simulation must be logical and convincing that the invention works.*
- *Constraints must be clearly included in the logbook or the project will be heavily penalized.*

## 5. References

Read <http://www.bibme.org/citation-guide/apa/> on how to cite references.

**5 A Cite the references you have used for your project work. Your source of reference should come from different types (e.g. books, magazines, websites, journal articles, interview, photographs, product brochure, reviews etc.)**

Ever Bamboo. **Why Bamboo Charcoal?** Retrieved from  
<https://everbamboo.com/pages/why-bamboo-charcoal>

Adelson, K. I. A. (2021, January 25). **The Best Face Mask Filters, According to Doctors and Scientists.** New York Magazine. <https://nymag.com/strategist/article/best-face-mask-filters.html>