

***Hwa Chong Institution***  
***Project Work***  
***Category 3 Inventions Log Book***

<i>Title of Project: ElyteChair</i>
<i>Group Name:</i> <i>3-44</i>
<i>Group Members:</i>  <i>1)Lai Yi Fang(L)</i>  <i>2)Yang Hong Yu</i>  <i>3)Fan Shao Cong</i>  <i>4)Zhang Jin Rui</i>

## **1. Problem Finding**

**Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches eg 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.**

*Our group, upon consideration, identified the following problems:*

- 1) *Students' bags are messy, resulting in their frequent loss of worksheets.*
- 2) *People nowadays spend too much time sitting in front of an electronic screen; not having enough exercise.*
- 3) *When elderly go out to purchase groceries, they may get tired of walking, and they might also get wet if it rains!*

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

- 1) *Is the problem solvable?*

Yes it is solvable. We just need to find a way.

- 2) *Is there really such a problem?*

Yes. We observed that our grandparents and even some of their friends encounter such problems in daily lives. Often after they have finished shopping, it starts raining and they have to wait for the rain to stop before making it back home. Sometimes they have to bring an umbrella and it is also really troublesome for them to hold both the groceries and the umbrella.

When we go on walking trips in Singapore or family trips overseas, our grandparents may feel tired after a long hike, and would thus want to rest. However, at times, they may not find anywhere suitable to rest.

- 3) *Is the problem worth solving?*

Yes. According to a study by the Singapore Department of statistics, globally, there are about 962 million people aged 60 and above today, which is more than double the 382 million in 1980. The size of this group is expected to double again to almost 2.1 billion by 2050. In Singapore, there are already 1.8 million people aged 65 and older. This means that the people who might need our chair is substantial.

Additionally, we did a survey, and although 94.3% of the 228 people surveyed do not currently use walking sticks, only 14.9% of them are sure they or their family members will not need a walking stick in the future. Even though most of the 228 people are 49 and below, 63% feel that it is hard to hold both their groceries and an umbrella.

**1 C** *List some problems your group would like to solve. List also the considerations for selection of problem 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.*

See Appendix Figure 1

## **2. Define the Problem**

*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)*

*We did a survey, and out of the 228 people surveyed, 63% find it hard to hold both their groceries and an umbrella. Also, 54.8% wish they had somewhere to sit when they are tired while 28.9% sometimes wish they had a place to sit when tired. ( Refer to Appendix Figure 4)*

*The elderly cannot walk very long distances because of their old bones and has to find somewhere to sit from time to time while travelling.*

*The elderly also need shade as some could not withstand the blaze of the sun. When there are no nearby seats or shade the elderly had to bear the pain of walking to a place with shade and seat or just deal with the painful positioning they are in now. Even if they have a walking stick with seat, they might suffer the heat of the sun or get wet in the rain. To solve this, they might retrieve an umbrella from their bags. However, it would be tiresome to hold the umbrella whilst simultaneously holding groceries after a while.*

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

*The umbrella walking cane has been invented to provide shade for the users but does not have a chair for people to sit on and is unable to use both the function of a walking stick and the umbrella at once.*

*Although the walking cane-chair has been invented, sometimes the elderly find themselves sitting under the hot sun because there was no nearby shade. A similar problem might occur when the elderly is sitting down on a walking stick/chair hybrid and gets sweaty and grilled under the hot sun.*

*There are also umbrella chairs, but the design only allows the elderly to switch between chair and umbrella so its either seat without shade or shade without seat. This invention also does not have the ability to be a walking stick so it cannot support the elderly when they walk and the elderly had to carry it around.*

### 3.

#### **Your BIG 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.**

*Our Proposed invention comprises of a walking stick - chair with an umbrella attached to it. It allows the elderly to set up a chair to sit, and a self supporting umbrella to cover the elderly even as they do so they don't get wet in the rain. The umbrella can be removed, or it along with its supporting arm can be folded into a part of the walking stick.*

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

When elderly go out to purchase groceries, they may get tired of walking and may decide to use a handy chair that extends from a walking stick. If the elderly person has noticed the possible chance of rain and brought an umbrella, they would naturally open up the umbrella to cover themselves from the rain. But from this arises yet another problem. The elderly may get tired of holding the umbrella whilst holding their heavy groceries. That is where our invention comes in to help the elderly hold the umbrella up while sitting and allowing the user to hold their groceries.

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

One major difference between our product and other products are that the other products either have a combination of an umbrella with a walking stick or a chair with a walking stick, but never a mix of the three - the aim of our project. *It is easier to carry our walking stick-chair-umbrella hybrid than to hold an umbrella in one hand while simultaneously holding a foldable chair-walking stick hybrid. Our design makes it almost hands free!*

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

It may be quite hard to make as we may not be able to get the resources necessary for making the invention. The umbrella must be light enough but big enough to provide shelter for the entire person, hence it would be quite hard to balance the weight of everything to make it easy for the elderly to carry.

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

The major milestone is when we have perfected the invention and we will release it once it is complete and working.

## **4. Construction Process**

*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.*

*As we do not have the money or experience to work with the desired metal products, we decided to make a prototype of it out of different objects we acquired: umbrella, walking stick chair and a hinge to adjust the umbrella. However, the final product will be neater and nicer.*

*We will be using (material: Probably carbon) for the prototype as it is light but also very durable and waterproof. It is perfect for making the invention as it would allow the elderly to carry it with ease.*

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

- 1. Must be light enough to be carried easily.*
- 2. Must be durable.*
- 3. Must be waterproof.*
- 4. Must be able to transform into the chair without much delay.*
- 5. Must be stable and strong enough to support the elderly.*

*4 C Document the prototype/ product development stages. You may use drawings, photographs or videos.*

*See Appendix Figure 2*

## **5. Modification and Evaluation**

*Upon the completion of your prototype/ product, you would need to see if it is working the way you want it to work. Check if your product has met the identified purpose and the user's need; and implement necessary modifications and improvements. This process may take several rounds.*

*5 A Write down your prototype/product test criteria and check again if it works. Identify areas of weakness for modification. Indicate the test iteration and date of test.*

*See Appendix Figure 3.*

**Figure 1**

**Problem Evaluation Grid**

*\*add more columns and rows where necessary*

<i>Considerations for Selection</i>	<i>Problems</i>		
	<i>#1 Students bags are messy.</i>	<i>#2 People nowadays spend too much time in front of an electric screen; not enough exercise</i>	<i>#3 Elderly who get tired easily while walking/hiking and holding up an umbrella at the same time.</i>
<i>Consideration 1: Is the problem solvable</i>	4	4	4
<i>Consideration 2: Is the problem real</i>	4	6	6
<i>Consideration 3: Is the problem worth solving?</i>	3	5	6
<i>Total Score(/20)</i>	11	15	16

**APPENDIX**

*Figure 2*



*Design*



*Mini prototype 1 (using popsicle sticks, satay sticks and paper)*

*Figure 2 (cont'd)*



*Mini prototype 2 (using satay sticks, colour pencil, bubble wrap, rubber band and paper)*



*Prototype 3: from left to right: standing version, folded version (using umbrella, walking stick chair, hinge)*

**APPENDIX**

*Figure 3*

<i>Test Iteration:</i>	<i>Tick</i>			<i>Remarks</i>
<i>Test Date:</i>	<i>Pass</i>	<i>Fail</i>	<i>Potential Failure</i>	
<i>Test Criteria 1 30 June 2019 (mini version)</i>	√			<i>Doesn't work as a walking stick</i>
<i>Test Criteria 2 (mini version 2)</i>	√		√	<i>Umbrella doesn't cover head</i>
<i>Test Criteria 3 finals onwards (full size version 1)</i>			√	<i>May not be light enough for all elderly to carry</i>

*\*Add more rows for more criteria*

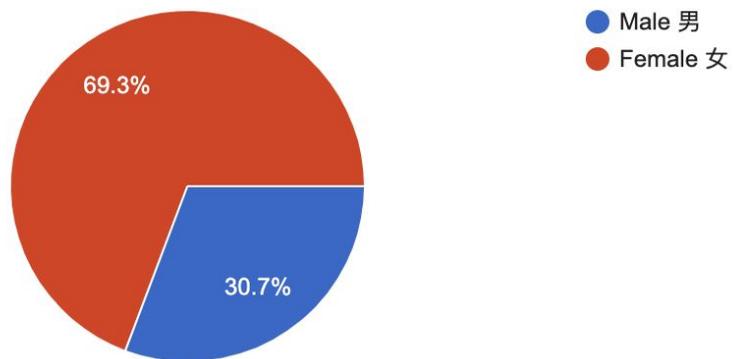
*\*\* Repeat table for next test iteration*

Figure 4

Our survey results

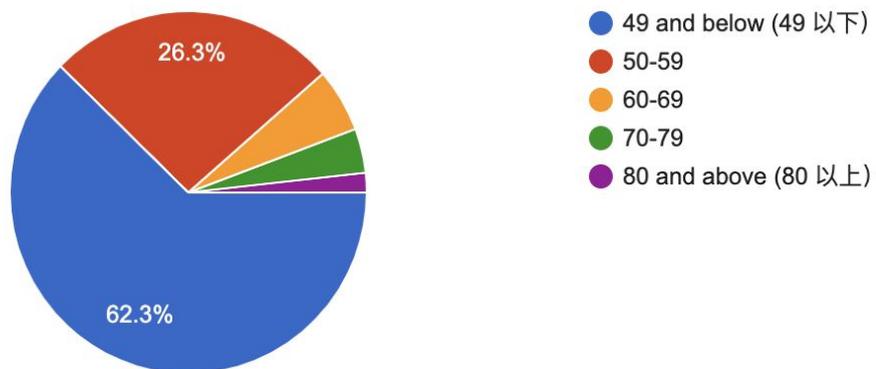
Interviewee gender 受访问者性别

228 responses



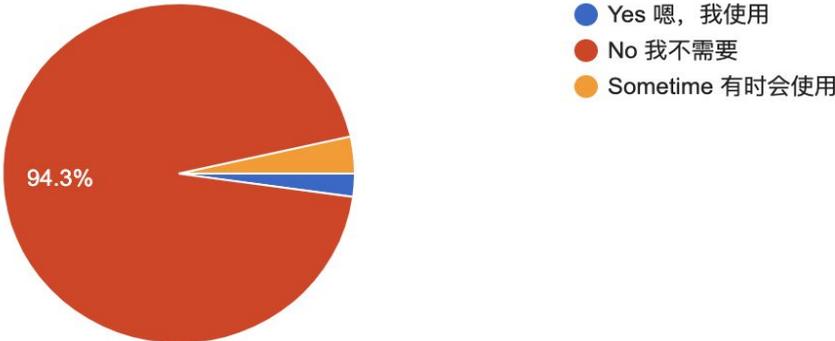
How young are you? 请问您贵庚?

228 responses



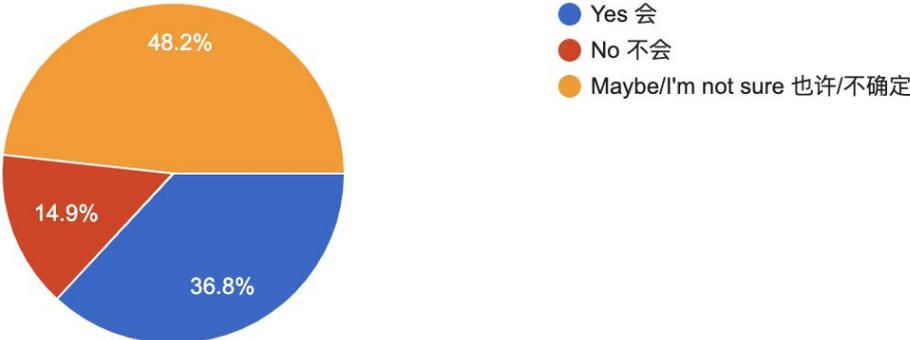
### Do you use a walking stick? 您使用拐杖吗?

228 responses



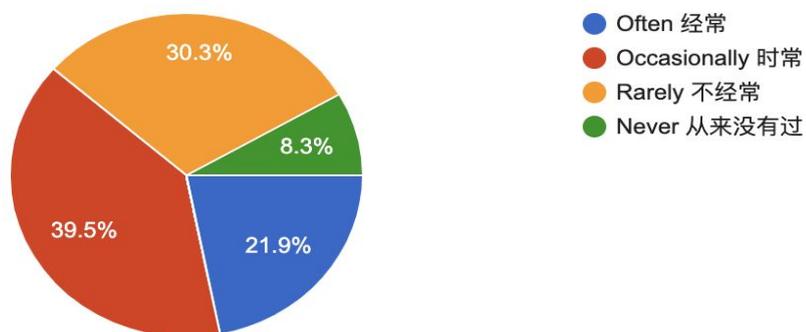
### Do you think you or any of your family members might need a walking stick in the future? 您和您家人以后可能会需要拐杖吗?

228 responses



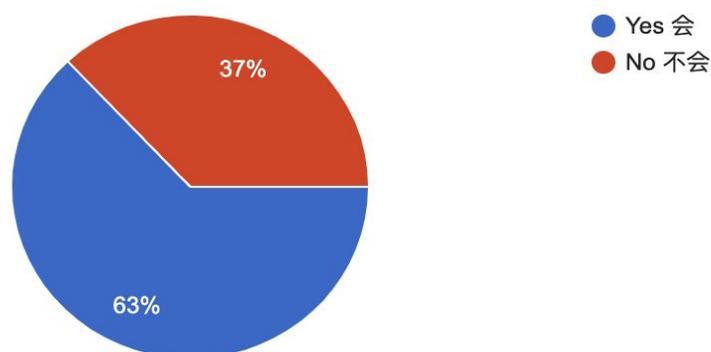
When you take your family to go hiking or traveling, sometimes halfway through, do you feel tired, in need of shelter from rain or the glaring sun and want to sit down and rest? 您或帶长辈去健行或旅行，是否遇到累了，找不到遮阳，躲雨，坐下来休息的地方？

228 responses



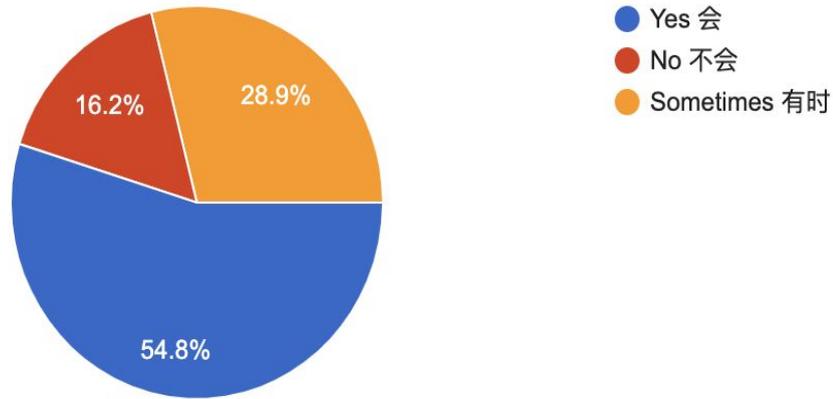
Do you find it hard to hold both your groceries and an umbrella? 您认为边拿杂货边拿雨伞难吗？

227 responses



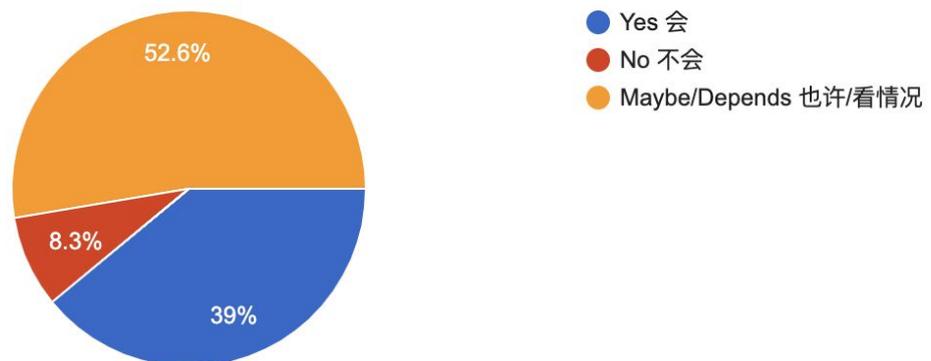
Do you wish you had somewhere to sit when you are tired? 当您走到  
半路时， 会想要坐下来休息吗?

228 responses



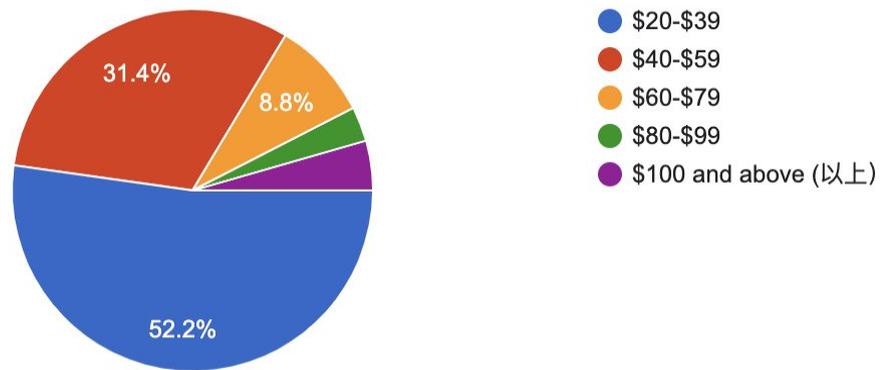
Would you buy a product that could solve all your above problems?  
如果有一款产品， 可以用作拐杖， 可以让您和家人出门在外， 走累了  
可以随时坐下来休息， 并且可以为您遮阳， 遮雨的产品， 您会购买  
吗?

228 responses



# How much would you pay for such a product? 您愿意花多少钱来买这种产品?

226 responses



## 6.References

(Thanks...)

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

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

<https://www.youtube.com/watch?v=iU6cc6v7dR0&list=PLWx4fE4kquUEXq38LqRwhdAstS-rkBKz3&index=6&t=0s>

