FACULTY OF COMPUTING
UTM Johor Bahru

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Name of Lecturer	: Dr Azurah Binti A Samah
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1.0 INTRODUCTION

Design thinking is an extension of innovation that we can use to solve simple or complex problems. This design thinking is the skill to have critical thinking to fulfill user's requirements which can help to provide convenience to the user.

For example, our product of design thinking is a solar-powered air cooler. An air cooler is a device that is used to make the indoors or the outdoors cooler. It is also an eco-friendly alternative product compared to an air conditioner because an air cooler only needs ice cubes to function.

2.0 DETAIL STEP AND DESCRIPTION

Empathy

Empathy is the stage where we should understand the problems faced by our respondent. Our target is all types of people who might face the same problems during hot day, and we chose a few of our classmates as our respondents for interview. At the beginning of the interview, we asked our respondents about their experience throughout summer or hot days as this might be useful for us in identifying their problems.

Define

Define is the stage for us to identify the problems faced by the respondents. After we analyzed our respondent response and their point of view, we were able to identify their problems based on their answers that were given in the interview session.

Ideate

Ideate is the stage for brainstorming where we can generate all possible solutions for this problem statement. In this stage, we suggested thinking outside the box and sharpening out critical thinking skills so that we be able to produce a wonderful and brilliant outcome.

Prototype

Prototype is the stage for us to select the most suitable idea from the possible ideas and turn the idea into prototype. We had decided to use the most suitable material for our air cooler and also, we added some new characteristics and improvised this air cooler so that our product will seem different compared to other products. The prototype was air cooler by using simple wiring, plastic container and also a solar panel.

Test

Test is the stage where our product should be tested first and to make sure it is working as planned. After that we will gain feedback from the user so that we can improve our product. Lastly, we also asked for user feedback on our product.

3.0 DETAILED DESCRIPTION

PROBLEM

After the interview session, we found that the user was having a problem with the current weather that is not consistent. On top of that, students are not comfortable sitting in the room as the room is getting hot due to the heat from the surrounding and restricted airflow in the room. Even though the ceiling fan is constantly spinning to cool the room, the cooling effect is proven inefficient for heat to flow out of the room. The current situation affected the well-being of students.

SOLUTION

After the discussion, we decided to make a product which is a solar-powered air cooler. The reason we chose to make this product is because it can help the students that have a problem with their room while their room is getting hot. That is because a solar-powered air cooler has a function that will keep the room in a cold condition. It also provides a clean and renewable source of energy that can also significantly reduce electricity bills. Solar-powered air cooler is easy to use because it only needing some ice to get a cool function.

TEAM WORKING

Each of the team members was given a few tasks. The task will include contents for the report, the discussion about the prototype of the solar-powered air cooler, the video recording of the design thinking and interviewing with various informants.

One of the challenges that we faced during the initial phase is the difficulty of coming up with an idea for the design thinking solution. Another challenge posed is the limitation of the time for the project as each of the members has different schedules and it is hard to synchronize with each other to allocate time for the discussion of design thinking. However, our team is fortunate enough to understand the task at hand and do all the process efficiently.

4.0 DESIGN THINKING ASSESSMENT

4.1 THE END-OF-PROJECT DEMONSTRATION

The important aspect that we had learnt during the final phase of the project is that the final product or solution should be derived through detailed understanding of the problem that was faced by the client and as well as viewing from the lens of the client. The needs of the end users should be prioritized, and the final product should be proven useful and profitable in the market. The final product can be maintained or innovated should there be a need for the product to function for an indefinite amount of time.

4.2 THE TRANSITION BETWEEN DESIGN THINKING PHASES

At the early stages of the Design Thinking process, we all agreed to innovate an existing product, but we faced challenges due to the limitation of time. We need to find ample time to produce the product together because some of us have varying opinions on how to allocate and manage our time efficiently with the existence of multiple subjects and courses that each of us take. Only through good time management can we face these problems directly, and fortunately, we successfully completed the product altogether until the end.

5.0 DESIGN THINKING EVIDENCE

5a THE SAMPLE WORK

Figure 5.1 interview respondents (empathy phase)

Figure 5.2 define and ideate phase

Figure 5.3 prototype phase

Figure 5.4 test phase(product)

5b Record for each phase

Empathy
The table below shows the questions and answers that obtained from the interview.

Table 5.1: Details for interview session

Questions	Answers
Can you introduce yourself first?	My name is Ngu Yu Ling. I'm from Faculty of Computing and currently first year student.
In your opinion, what is the price range between fan and air conditioner ?	For me, fan around RM 20 and air conditioner around RM1500
Is it worth for the price between fan and air conditioner?	I guess so
Is the product material is eco- friendly?	For me, fan is eco – friendly while air conditioner is not.
Do you prefer mini fan or air conditioner?. Why?	Mini fan because mini fan is affordable and eco-friendly.

Questions	Answers
Can you introduce yourself first?	My name is Muhammad Amirun Irfan and I'm from Faculty of computing.
Do you have your own personal mini fan?	Yes, I do have my own mini fan.
Other than mini fan, do you have any other ideas to handle with hot weather?	No, I don't have.
How long do you think you can survive in a room with no fan and no air conditioner?	I will probably can survive in that room for 5 to 10 minutes.
During the day, how do you describe your room in term of temperature?	My room is like normal room temperature around 24 to 27 degrees .

Questions	Answers
Can you introduce yourself first?	I'm Welson and a first year of Faculty of Computing.
How often do you have to deal with hot weather?	I handle it almost every day except of rainy day.
And how do you handle with that kind of problem?	I bought a mini fan for myself so I can bring it everywhere as it is portable.
Do you have your own personal mini fan?	Yes, I do.
How often use your mini fan?	I use it almost of the time. Even when I'm walking to the class or when I'm staying inside my room because the weather is hot.

Define
The table shows the problem faced by the respondent.

Table 5.2: Problems faced by respondent

Problems	Descriptions
Hot weather	The weather is hot, and the heat affect the well-being of the respondents.
Expenses	The air conditioner is a more expensive than mini fan.

Ideate
Recommended solution.

Solution	❖ Produce a solar-powered air cooler

Prototype
During our discussion, we decided to produce a solar- powered air cooler. The reason why we decided to produce this product is because it can help with the hot weather. As an example, when our respondents which is a student that having a problem with their room while their room is getting hot, this product can help solve it. We produce this product because it has a function that will keep the room in a cold condition. We also use solar panel because it can provide renewable energy that can significantly reduce the electricity bills.It is also easier for the user to bring to anywhere because it is portable. This product also only needs some ice to get it to produce a cool function.

The table below shows the characteristics of the modified air cooler fan.

Table 5.3:

	Characteristics	Description
Existing Function	Fan	The fan will be spinning, and it will blow the ice or cold water to produce the cold function
	Wire	It is used to connect a fan, a solar panel and the source energy.
	Water design tank	A place to put the ice or cold water
Extra Function	Solar panel	It will produce energy for the battery if it being put under the sunlight.

Test
After we finished the prototype, we decided to demonstrate our product to our respondents.We gave a detailed explanation about the product and how it can bring us benefits through the function that we added. They gave positive feedback that this product would benefit them during this hot weather because it has a cold function that will cool down the temperature. It also can reduce their expenses to buy a battery for this product as it can be charged under the sunlight.

6.0 REFLECTION

Reflection 1

a) Our goal is to combine ideas of different products so that we can create a product that have both function of these products. Since our target is student UTM so we need to listen to the words from UTM students by ourselves first to identify the problem so that we can make a solution for them. At the same time, it would bring benefits such as comfort to the customer and people around them as well.

b) At first, we don't have an idea for our project so by using empathize mode we be able to **observe, engage** and **immerse** though UTM student especially my classmates. Furthermore, define mode help us to have our point of view so that it could be a guiding statement that focuses on specific users and to helps us to discover what kind of project that we will be making. Other than that, ideate mode is involved when our group wants to generate a few ideas and we use the brainstorm rules such as **be visual, build on the ideas of others, stay on topic,** and **headline.** In addition, when it comes to prototype, we encounter a lot of different problems at first but then we follow "tips for pitching & presentation" for example **start building, build with your group in mind,** and **label your point of view.** After that we were able to solve all the problems and we also improvised some characteristics of our prototype. Lastly, when we test our prototype, we be able to detect if there is malfunction or do we need to add anything else. This is the chance to refine our solutions and make them better.

c) In my opinion, I must be involved in more group work and socializing so that it can improve my soft skills, for instance communication skills and teamwork. I also need to do focus more on problem solving because it's one of the ways to improve my critical thinking skills. Other than that, I need to work more on my practical skills because it is very important when it comes to prototype. During this project I felt that I couldn't perform well because of my lack of experience thus I have to get involved in practical skills or workshop.

Reflection 2

a) Our dream is to make a product out of the box using technology and can reduce environmental damage. After we collected the data from our respondents, who are students, we can see that they have some problem with the weather in our country. So, we decided to make a product with another technology which is called solar-powered energy which can help the students and can help the environment.

b) The first thing that I did in the Design Thinking process is think which every of us has different ideas. When all of us were discussing together, we combined our ideas until we got the idea to make this product. From this, I have learned that working in a group is better than working alone. Other than that, from our product, I've also learned that if we don't reduce environmental damage, weather problems can't be solve. That is why solar energy is the one way to solve this problem because it has a measurable effect on the environment.

c) From the Design Thinking process, I can learn how much difficult to make one product within a limited time. I need to think about the product kindly to get functioning and need to think critically. This process can help me to improve my soft skills because we need to do the discussion in the group and also to do the presentation for the prototype.

Moreover, the design thinking process can help me to gain more knowledge and experience because I need to do some research to know if there are benefits while adding another technology in our product.

We can conclude that design thinking can improve ourselves in various matters.

Reflection 3

a) In my opinion, we are living in the modern age and the technology nowadays is quite advanced compared to the periods before. However, why can't the existing technology be improved to target climate change and other environmental problems specifically? Therefore, by creating this miniature cooler that uses renewable energy, we might provide some insights to others on how to implement solutions to reduce the impact of global warming and counteract the effects rising temperatures.

b) I've also learnt that if we stagnate or remain ignorant about the development of green technology and sustainability, we will forever be trapped in a vicious cycle of climate change, and the future generations will have no way to continue inhabiting the earth and are forced to migrate to other hospitable planets.

c) I've hoped to see that this design thinking project in the Technology and Information Systems can greatly benefit my goal and aid me in the process of achieving a holistic overview of courses related to technology and computers in general.
Furthermore, with this design thinking process, I get to witness different types of solutions and contributions of my peers as well as other groups regarding the development of ideas and final products in the making.
As a conclusion, I think that the necessary skills to help improve my potential in the information and technology industry is to have a good interpersonal relationship, be good at communicating to better build teamwork, be observant and to keep abreast in the development of newer technology and finally constantly learning to polish my skill so as to remain relevant in the industry during the coming years.

Reflection 4

a) I have a dream to be a programmer. When I'm doing a bit of research about jobs related to bioinformatics. One of the jobs that intrigued my interest is bioinformatics programmer. It is stated that a bioinformatics programmer creates living materials algorithms. Consequently, to achieve that dream, it has many desired skills such as applications programming, web development and data structures, modification and implementation. Therefore, I will learn many skills related to it so that I can apply to many jobs in the future as all the skills can be used for various works.

b) From this design thinking project, I've learnt how to communicate with my groupmates. Communication is one of the skills and the key to solve a problem or achieve one solution for the problem. It is important to communicate well with each other because we can hear the opinion or suggestion from every aspect that we didn't think about by ourselves. The suggestion that I am not thinking about when I think of air cooler fan is how to make it eco – friendly as I am being too ignorant on how it can impact on our life. So, when one of my groupmates suggest use to make it environmentally healthy, I realize that it is important as the global warming becomes worse in this age and if we didn't take care of the using of non-environmentally healthy products, we will make the global warming become worsen. To conclude, we all agree with the using of solar panel that use renewable source to reduce the global warming.

c) Based on my opinion, I have to improve my soft skills such as teamwork skills. I also have to contribute more to the project because when we are doing the group project, it can help us to understand what the project is about and how's the products that we make function. It is also related to communication skills. We have to communicate with each other if we are not clear about something. It also can give us benefits as when the other person explains it to you, you will be clearer about things. These skills can affect your potential in the industry as it will benefit you when you are doing your job in the future because you have to learn on how to do your job and it consists when you are a newbie to the job. You have to produce a good projects and to achieve that, you have to get confirmation from your supervisor or boss about the projects.

Reflection 5

a) We aspire to innovate something that can be useful for teenage nowadays by listen to their words especially UTM student. At the same time, we should look at another angle that involves its impact on the environment, quality of lifestyle and also how to connect it with technology in a better way.

b) From the prototype we made, we found that its not easy to build up a new product as there is existing product in this world. So, we meet up and discuss to get each other's ideas and choose the best to do. However, we choose to bring up air cooler with solar version to solve the UTM's student's problem which is weather very hot and expenses price. We found out that using solar system is the best way since they generate renewable energy which is far better for the environment also not expensive for student.

c) For me, I should get better in communication because to create something in a group there is one important thing which is communication. We must hear other's opinion and combine it to get an ideas. Other than that, I must to do a research to produce a product or to modify an existing product. Since It was group work, its important to give task to each other so that all the group member's have their own work to do. Other's soft skill is very important and I need to learn more and improving myself to get better in future.

7.0 THE TASK FOR EACH MEMBER

NAME		MUHAMAD HAFIZ BIN MOHD SHAHARUDDIN	KWAN ZHI REN	NUUR AISYAH BINTI RUZI	NURUL NATALIA BINTI ROSNIZAM	NATIJAH BINTI HUDA
TASKS	Interview, Discussion, Prototype and Test Sections	Interview (Empathy)		Producing Prototype		
		Test & Discussion for Define and Ideate phase				
	Documentation and Presentation	Slide Presentation		Editing Videos		
	Report	Detail Step and Descriptions for each phase		Design thinking Evidence (5b)	Introduction	Design Thinking Evidence (5a)
		Design Thinking Assessment	Detailed Description (problem, solutions and team working)			
		Reflection (individual)				
		-			Merge and Compile the Report	