



SECP1513-02 TECHNOLOGY AND INFORMATION SYSTEM

Design Thinking Project Report

Project Title : Smart E-Learning Hub

Group : 6

Dr. Aryati binti Bakri

Group Members:

 <p>Kalaitharan A/L Palanyvelu A24CS0092</p>	 <p>Maxivianna binti Robert A24CS0109</p>	 <p>Muhammad Al-Hakimi Haikal bin Romi Sabihin A24CS0271</p>
 <p>Gwee Zi Ni A24CS0078</p>	 <p>Tan Xin Tian A24CS0198</p>	

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INTRODUCTION

What is Design Thinking?

Design thinking is a methodology for problem solving that is focused around the people it aims to serve, emphasizing understanding their needs, redefining problems and reevaluating ideas to identify alternative strategies and solutions. The process is iterative and non-linear, typically involving five stages:

1. Empathize:

The first stage is where you get yourself into the user's perspective. to have a deep understanding of their needs, challenges and experience. The purpose is to build deep empathy for the people you are designing the solution for.

2. Define:

In the Define stage, you will organize the information you have gathered during the Empathize stage. You'll analyze your observations to define the core problems you and your team have identified up to this point. Defining the problem and problem statement must be done in a human-centered manner.

3. Ideate:

During this stage, you are ready to generate ideas. You've grown a full understanding of the users perspective in the first stage, and you've analyzed your problem in the second stage. With this information in your hand, you and your team can explore the problem from various angles and brainstorm innovative solutions to address your problem statement.

4. Prototype

Your team will now design the scaled-down version of the product to visualize the idea and find key solutions for it. The prototypes can be tested within the team. By the end of the Prototype stage, the team will have a better idea of the product's limitations and the problems it faces.

5. Test

After prototyping comes user testing, but it's important to note that this is rarely the end of the Design Thinking process. In reality, the results of the testing phase will often lead you back to a previous step, providing the insights you need to redefine the original problem statement or to come up with new ideas you hadn't thought of before.

DETAIL STEPS

In November 2024, we were given a task to create a prototype based on the theme Big Data and Artificial Intelligence New Innovation. We scheduled meetings after meetings to brainstorm ideas and solutions related to this particular field. After researching and gathering our thoughts, we reached the conclusion of approaching this matter as a student who often uses the e-Learning platform on a daily basis. We found out that students are having a hard time accessing learning materials such as past year questions and research papers within the UTM as well as not knowing their effective study method. Hence, our team wishes to solve the problem by implementing AI-driven functions through the Smart E-Learning University Hub.

2.1 Empathize

Firstly, we conducted an online interview with our client, Arlyn bin Zulkifli, via an online platform which is Google Meet. At the same time, we carried out a survey for gathering and understanding issues faced by our users and their desired additional features in the E-Learning hub through Google Form. All the feedback from the clients obtained during the interview and survey sessions will be used for the next stage.

2.2 Define

In this stage, all the information gathered and gained from the empathize stage were analyzed during our discussion session and now we clearly understood the existing problems and users desired additional features. During the discussion session, we came up two with problem that currently exist in the E-learning Hub that our team would like to improve in this version. Overall, we determine the problem that we would like to improve are users unable to have extra academic materials due to lack of source to access assessment materials and supplementary learning materials. Not only that, students who unfamiliar with the campus spend lots of time to find the venue of lecture room, the venue of sports and recreation or facilities and the real-time activities in the campus.

2.3 Ideate

After having clear problem statements, we managed to come up with a brainstorming solution for improving the existing problems and add on the user desired features or tools. The solutions that we will adopt are using AI which is able to personalize learning paths and provide past year exam papers, academic resources by alumni of UTM, digital resources like educational videos and recorded lectures. Not only that, AI can be as a virtual assistant that make the user know the accurate location of lecture classroom when students ask in the AI chatbot and it also shows the real-time events or activities that currently held in the campus, including the location of that event.

2.4 Prototype

This phase involves creating tangible representations of our solution before testing its feasibility. We created a low-fidelity prototype by sketching the interface's designs and mockups using papers. We ensured that each function and feature fully meet the users' requirements.

2.5 Test

Finally, the prototype testing phase is where we test the prototype to make sure the product is working smoothly. The first test run was conducted by our team to detect any errors. Next, we invited some students to interact with the prototype in realistic scenarios. In this phase, we were able to refine our products based on real user feedback.

DETAILED DESCRIPTION

3.1 Problem

In the e-Learning plays a crucial role in modern education, our team spent a lot of time brainstorming and researching, and we found several problems with the current e-Learning platform at UTM. The main issue is that students have trouble getting supplementary academic materials, like past exam papers, research papers, and other resources in the UTM Library. Many students find it hard to locate these materials, which are key for their studies and exam prep.

Moreover, Time management challenges, a lack of personalized learning plans, and poor study scheduling are common barriers to academic success. When students struggle with time management, it often results in procrastination and missed deadlines. This can be improved by implementing time-blocking techniques, which involve setting aside specific hours for tasks, and prioritizing activities using. Furthermore, many students encounter the problem of generic study plans that do not address their unique learning needs.

These problems make learning less effective and lead to a frustrating experience for students. Therefore, this project aimed to find creative solutions using AI to address these issues and enhance students' access to academic materials and campus information.

3.2 Solution

Our team has proposed creating an AI-driven Smart E-Learning University Hub to tackle these challenges. This initiative aims to improve the current e-learning platform by introducing a range of AI-powered features tailored to meet the needs of students.

A key feature of this solution is an AI system that customizes learning paths for each individual student. The AI will recommend relevant learning materials, including past exam papers, research papers from UTM alumni, educational videos, and recorded lectures. This will provide students with easy access to academic resources that can help them succeed in their studies.

Moreover, the AI will function as a virtual assistant within the platform. It will offer students real-time updates on campus activities, events, and workshops, along with their locations and schedules. The AI will also help students navigate the campus by accurately identifying the locations of lecture rooms, sports facilities, and other important areas, minimizing the time spent searching for them. This all-encompassing AI-driven strategy ensures that students enjoy a more streamlined, efficient, and personalized learning experience.

3.3 Team Working

Our team was made up of a diverse group of individuals with different areas of expertise, which played a vital role in overcoming the challenges of the project. We kicked off the project with a series of meetings aimed at brainstorming and defining the issues at hand, allowing each team member to share their insights based on their experiences as students using the e-learning platform. Collaboration and open communication between team members were essential for understanding the pain points and developing innovative solutions.

During the empathize phase, we conducted an interview with AI student, Arlyn bin Zulkifli, and gathered feedback from students through surveys. These sessions enabled us to collect real user data and pinpoint both technical and user experience issues with the existing system. Each team member took charge of specific aspects of the research and interactions, with some focusing on data collection while others analyzed the findings.

In the define phase, we all engaged in analyzing the information we gathered to gain a clear understanding of the problems and propose solutions. Teamwork was crucial in identifying the most significant issues to tackle, ensuring our focus was on areas that would enhance students' academic experiences and campus life.

During the ideation phase, we held brainstorming sessions to come up with ideas for AI-driven solutions. We merged our knowledge of AI technologies with feedback from students and faculty, developing an approach that was both technically feasible and user-friendly. The team collaborated to design the core features, ensuring that the solutions were tailored to the specific needs of students.

As we progressed to the prototyping phase, the team worked simultaneously to create low-fidelity mockups and interface designs. Each member contributed to crafting a simple yet effective visual representation of how the solution would look and function, making sure it

aligned with user requirements. Finally, in the testing phase, our team carried out multiple rounds of testing, starting internally.

DESIGN THINKING ASSESSMENT POINTS

Our assessment aimed to improve the e-learning platform so that students can easily access learning materials.

At the very beginning of the stage, which is the Empathize stage, we conducted an online interview with our client to gain insights into their needs and challenges. Simultaneously, we distributed a survey through Google Forms to gather feedback from users on the issues they faced and the additional features they desired for the E-Learning hub. The feedback collected from both the interview and survey will be used to inform the next stage.

Next, we move to the Define phase. Our teams analyzed the problem statements mentioned by the users during the empathize phase. We summarized the problems and improvements users desired, and then listed them down.

In the Ideate phase, we brainstormed potential solutions for the problems identified in the Define phase. After evaluating all options, we agreed on the best solution to move forward with.

Lastly, we proceed to the Prototype phase by using the solution created during the ideate phase. Our prototype is a new e-learning platform with many improvements, for example, AI Chatbot on the screen. The main improvement is that it helps the users to get access to learning materials easily.

DESIGN THINKING EVIDENCE

Empathy Phase

Our team member Muhammad Al-Hakimi Haikal Bin Romi Sabihin organized an interview with Aryl bin Zulkifli, which is a student studying in AI course at Universiti Teknologi Malaysia(UTM) Kuala Lumpur campus by using Discord. From this interview, we quest his opinion about the features of AI that can be integrated in the E-learning for the purpose of benefit the students from academic aspects. We also conducted a survey by using Google Form to collect and comprehend the problems that our users faced as well as their suggested extra functionality or features in E-learning hub.



Figure 1: Interview with Aryl bin Zulkifli

Interview Questions

1. As a first year student who is studying in AI, what's your opinion that AI can be used by students to solve their problem like less motivation to study or solve a problem for a specific subject?

2. In your opinion, what's the feature that should be included in E-learning that can benefit the student in the aspect of learning?

3. Whether AI is able to act as a role of lecturer to assist students?



Figure 2: List of questions during the interview

Overall Experience

Rate your overall satisfaction with the E-Learning Hub. *

Very Unsatisfied
 Unsatisfied
 Neutral
 Satisfied
 Very Satisfied

What do you primarily use the e-learning hub for? *

Lecture notes
 Assignments
 Quizzes
 Group projects
 Forums
 其他: _____

How easy is it to navigate the e-learning hub? *

Very Difficult
 Difficult
 Neutral
 Easy
 Very Easy

Figure 3.1

Areas for Improvement

Do you experience technical issues with the eLearning hub? If yes, *
please describe.

No issues at all
 Slow load times
 Login errors
 Difficulty accessing certain resources or features
 Compatibility issues with devices or browsers
 Frequent crashes or errors during use
 Issues with submission of assignment / quiz / exam
 其他: _____

How satisfied are you with the available communication options (e.g., *
forums, announcements) in the eLearning hub?

Satisfied
 Not satisfied

How well does the eLearning hub integrate with other tools and *
platforms you use (e.g., email, Google Drive, study management tools)?

Poor Integration
 Below Average Integration
 Average Integration
 Good Integration
 Excellent Integration

Figure 3.2

What additional features or tools would help you make better use of the *
eLearning hub?

您的回答

What features of the eLearning hub do you think should be prioritized *
for future updates?

您的回答

If you could make one major improvement to the eLearning hub, what *
would it be?

您的回答

Figure 3.3

Opinion on AI-integrated E-learning Hub

How beneficial do you think AI features (e.g., personalized learning, automated grading, or virtual assistants) are for improving your learning experience? *

Not Beneficial
 Slightly Beneficial
 Moderately Beneficial
 Very Beneficial
 Extremely Beneficial

Which AI-powered feature would you find most useful in the E-Learning * Hub?. You can choose more than 1 option.

Personalized learning paths
 Real-time virtual assistant support
 Automated grading and feedback
 Predictive learning analytics
 其他 _____

How confident are you that AI-powered features (e.g., automated grading, personalized feedback) will provide accurate and reliable results?

Not confident at all
 Slightly confident
 Neutral
 Confident
 Very confident

Figure 3.4

Do you believe AI could help you identify areas of improvement in your learning and offer personalized resources?

- Yes, definitely
 - Yes, somewhat
 - Not sure
 - No, not really
 - No, not at all
-

Do you have any concerns about using AI in the E-Learning Hub? If yes, *
please specify.

您的回答

Figure 3.5

Figure 3.1 to Figure 3.5:
List of questions from Google Form

Define Phase

During this phase, we collected all the data obtained from the interview session and the Google Form survey. This helped us gain a clearer understanding of the issues they faced, enabling us to design a solution that better addressed their needs.

Below here are the result from Google Form:

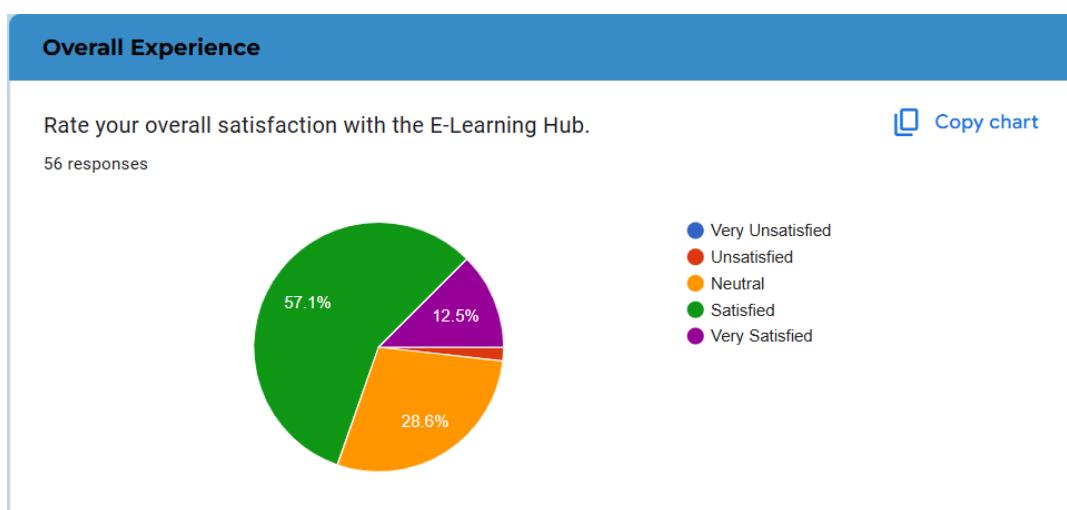


Figure 4.1

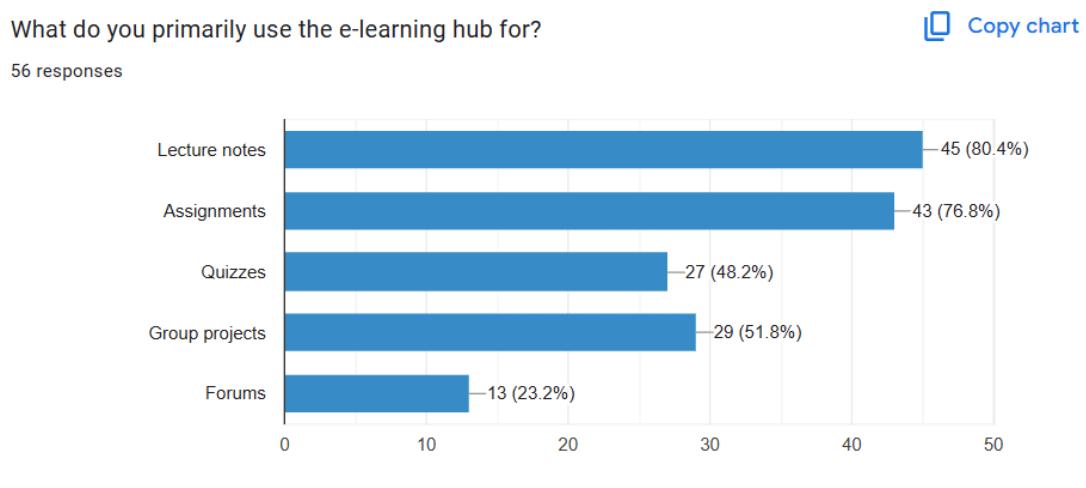


Figure 4.2

Opinion on AI-integrated E-learning Hub

How beneficial do you think AI features (e.g., personalized learning, automated grading, or virtual assistants) are for improving your learning experience?

56 responses

[Copy chart](#)

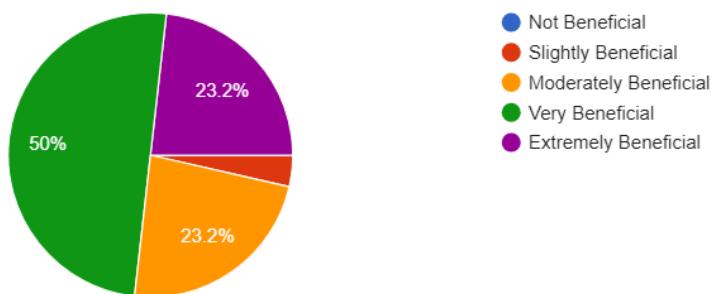


Figure 4.3

Which AI-powered feature would you find most useful in the E-Learning Hub?.
You can choose more than 1 option.

56 responses

[Copy chart](#)

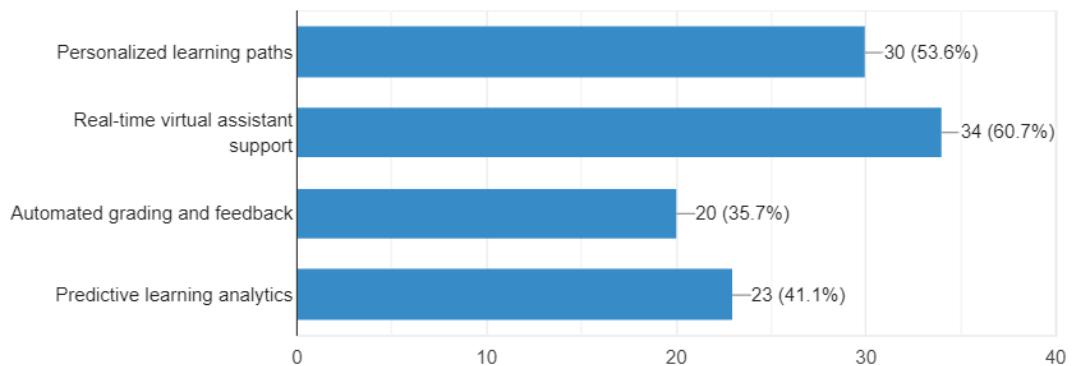


Figure 4.4

How satisfied are you with the available communication options (e.g., forums, announcements) in the eLearning hub?

[Copy chart](#)

56 responses

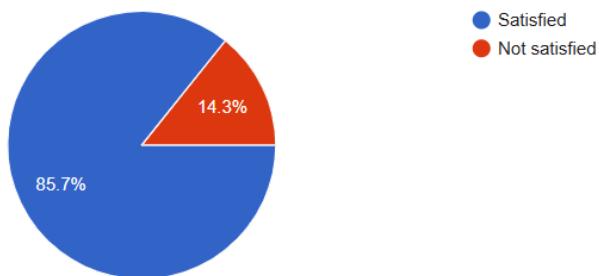


Figure 4.5

How well does the eLearning hub integrate with other tools and platforms you use (e.g., email, Google Drive, study management tools)?

[Copy chart](#)

56 responses

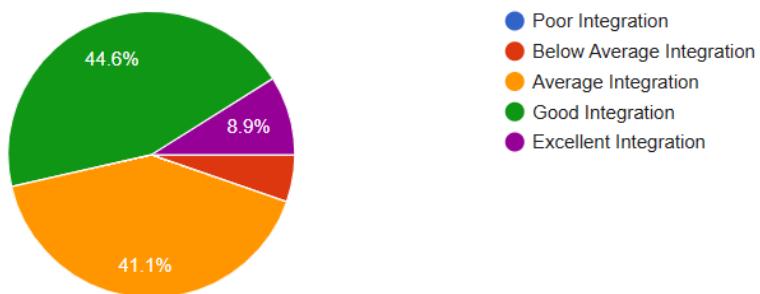


Figure 4.6

Ideate Phase

After identifying the problem faced by the users, we gather around to brainstorm the potential solutions to address the issues. Finally, we decided to add AI-driven features such as automated chatbox and personalized learning path to assist the users in acquiring relevant learning materials besides optimizing the user experience for e-Learning hub.



Figure 5.1

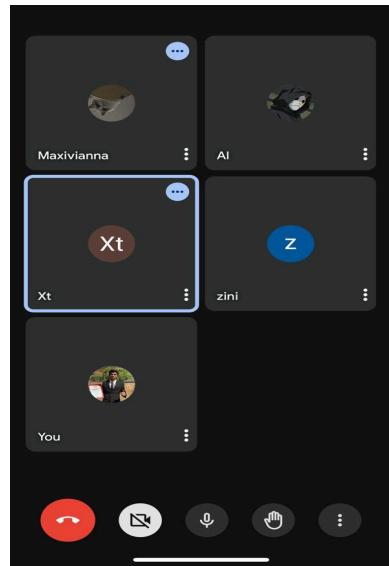
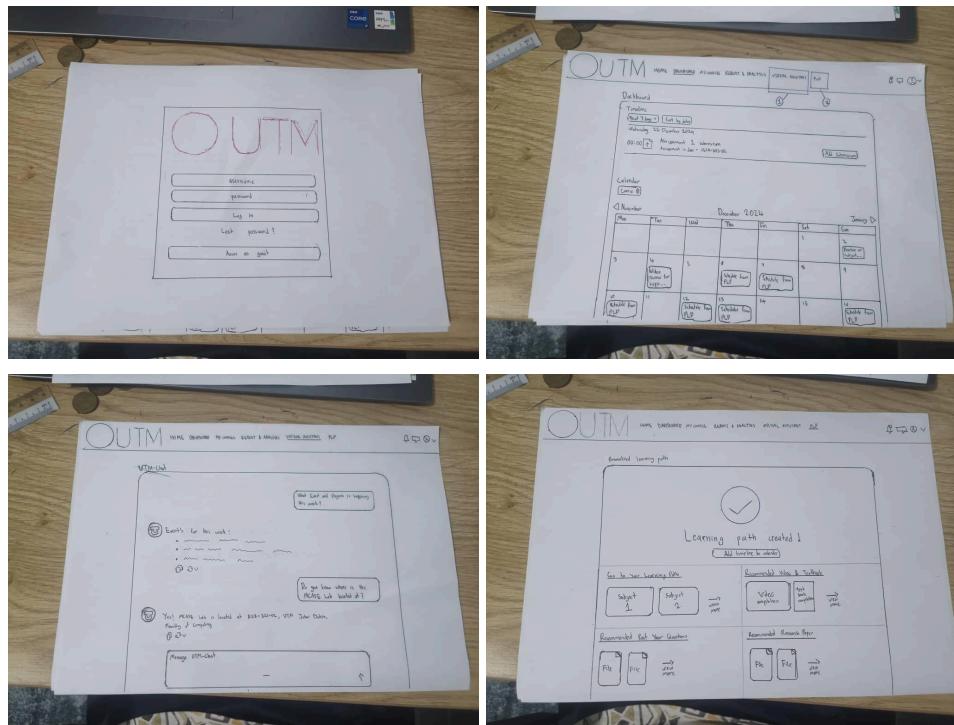


Figure 5.2

Brainstorming session through physical and virtual medium

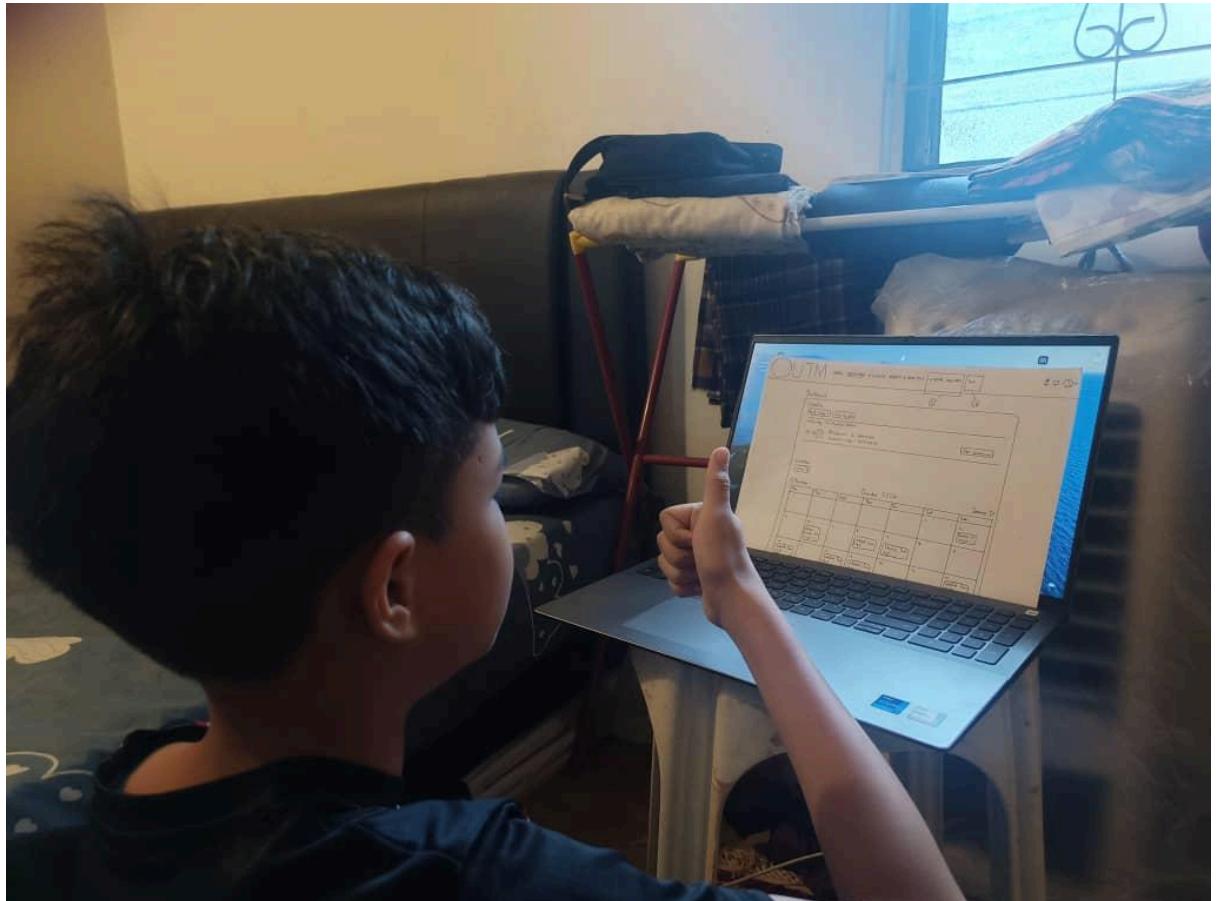
Prototype Phase

In the prototype phase, we utilized the ideas, insights, and data gathered from the earlier phases as the basis and direction for creating our prototype, ensuring that it fulfilled all the users' requirements.



Prototype Testing Phase

During the testing phase of the prototype, we invited several users to try it out. The majority provided positive feedback about the prototype, with one user mentioning that it could be highly beneficial for his studies.



REFLECTION

1) MUHAMMAD AL-HAKIMI HAIKAL BIN ROMI SABIHIN (A24CS0271)

a) What is your goal/dream with regard to your course/program?

My dream is to become an individual with solid communication skills. I want to enhance my ability to speak in front of people. Also, I hope to achieve a deep understanding of today's technology so I can confidently share knowledge, inspire others, and adapt to the ever-evolving demands of the modern world.

b) How does this design thinking impact on your goal/dream with regard to your program?

Throughout the process of this design thinking project, I learned how to communicate and collaborate better with my groupmates. It also helps me to understand the importance of brainstorming and appreciate multiple points of views.

c) What is the action/improvement/plan necessary for you to improve your potential in the industry?

I need to learn and adapt to the current technology and programming languages, and keep up to date with today's issues in the tech world while having a strong foundation of it. Also, I aim to take external courses with certificates related to my career path so that I can increase my skills and value in the job market.

2) KALAITHARAN A/L PALANYVELU (A24CS0092)

a) What is your goal/dream with regard to your course/program?

My primary goal is to become a skilled data engineer who can develop innovative and effective solutions for complex challenges. I want to enhance my knowledge of data management, cloud computing, and AI technologies. Through this program, I hope to acquire both the theoretical understanding and practical experience necessary to handle large datasets and provide meaningful solutions across different industries.

b) How does this design thinking impact on your goal/dream with regard to your program?

This design thinking project has provided me with valuable insights into the significance of user-centred design and iterative problem-solving. By participating in the Smart E-Learning University Hub, I was able to apply critical thinking and structured problem-solving to a real-world context. This experience has improved my analytical thinking, collaborative skills, and ability to explore various solutions for a problem. These competencies are directly relevant to my future career as a data engineer, where it is crucial to understand user needs, analyze data, and create scalable solutions.

c) What is the action/improvement/plan necessary for you to improve your potential in the industry?

To thrive in the data engineering sector, I need to continually enhance my technical skills, especially in areas such as big data processing, machine learning, and cloud technologies. I plan to focus on gaining practical experience with tools like Apache Hadoop, Spark, and Python. Additionally, I intend to keep up with industry trends by attending workshops, courses, and conferences. Building my professional network through mentorship and industry connections will also provide me with valuable insights and help me stay aligned with the evolving needs and challenges of the industry.

3) MAXIVIANNA BINTI ROBERT (A24CS0109)

a) What is your goal/dream with regard to your course/program?

My ultimate dream is to become a skilled data engineer capable of creating innovative solutions that address real-world challenges. Hence, for this particular course, my goal is to gain new knowledge about the technology and information system besides strengthening my understanding on the core of theoretical and practical data-based skills.

b) How does this design thinking impact on your goal/dream with regard to your program?

Through this design thinking project, I am able to hone my communication and collaboration skills. It also exposed me to analytical thinking and decision-making abilities. All of these will definitely be helpful in my future endeavor to pursue a career in the Computer Science field.

c) What is the action/improvement/plan necessary for you to improve your potential in the industry?

I need to equip myself with a solid foundation on technical expertise and train myself to keep up with the fast-paced advancement of technology. In order to do so, I plan to join a lot of workshops to experience diverse trends of technology as well as building connections with the professionals in the IT field.

4) GWEE ZI NI (A24CS0078)

a) What is your goal/dream with regard to your course/program?

I desire that I can integrate and apply all of the techniques that I learned well after I completed my bachelor degree. To become a qualified and good data engineer, I need to have a solid fundamental and in-depth knowledge for each field of study. Not only that I have to regard for the newest technologies news during my university years so that I can adapt myself in this rapid-changes of technologies era.

b) How does this design thinking impact on your goal/dream with regard to your program?

Since this design thinking is a group project, it trains me to learn how to interact with the others to integrate all the points of view from all team members and come up with an effective solution. At the same time, it also make me realized that integration of the 6 components of information system are absolutely significant and critical to one other and must be applied and worked at the same time so that all the function system can be created and improved to make the system operate smoothly.

c) What is the action/improvement/plan necessary for you to improve your potential in the industry?

Technical skills are the prioritized skill that I would like to improve and maybe I have to do more the research through various platform to ensure that I master more knowledge for adapting the fast-paced changes of technologies. Not only that, the soft skills like communication, negotiation and presentation skills are more and more significant skills and all of them can be said as the soft skills that should be mastered by everyone before they start their career. Hence, I have to involve more activities that able to train my speaking skills during my university years because I still does not have these soft skills.

5) TAN XIN TIAN (A24CS0198)

a) What is your goal/dream with regard to your course/program?

I hope that through this work-based learning course, I can learn the communication skills between peers, customers and leaders and truly learn how to work in society as a data engineer. Also, I hope I can deal with the problem well. I believe that my problem solving skills will improve to a high level through study in this course after graduation.

b) How does this design thinking impact on your goal/dream with regard to your program?

Through this design thinking project, I know how to communicate with my teammates better. Although we sometimes have disagreements, we all learn how to communicate until we find the best solution. On the other hand, this project requires constantly thinking about emerging problems and their solutions. Obviously, this greatly improves my problem solving skills.

c) What is the action/improvement/plan necessary for you to improve your potential in the industry?

I will study hard to master multiple computer languages like C++, HTML, Java... before graduation so that I can flexibly apply them in my future daily work. I will also keep improving my problem-solving skills, negotiation and presentation skills. For example, to improve my problem-solving skills, I will go on with practical examples in complex problem-solving tasks—whether for assignments, projects, or real-world applications. Besides, work in industry must face a lot of problems and can be stressful, I must deal with my emotion well so that it can be in a good condition. Overall, I must improve my potential in industry if I follow the plan and the course work.

TASK DISTRIBUTION

No.	Team Members	Task
1.	Muhammad Al-Hakimi Haikal bin Romi Sabihin A24CS0271	<ul style="list-style-type: none"> ● Report Writing (Introduction) ● Prototype Design ● Create Google Form for Survey
2.	Kalaitharan A/L Palanyvelu A24CS0092	<ul style="list-style-type: none"> ● Create Google Form for Survey ● Report Writing (Detailed Description)
3.	Maxivianna binti Robert A24CS0109	<ul style="list-style-type: none"> ● Report Writing (Detailed Steps) ● Report Writing (Design Thinking Evidence)
4.	Gwee Zi Ni A24CS0078	<ul style="list-style-type: none"> ● Report Writing (Detailed Steps) ● Report Writing (Design Thinking Evidence) ● Creating video
5.	Tan Xin Tian A24CS0198	<ul style="list-style-type: none"> ● Report Writing (Assessment Point) ● Report Writing (Design Thinking Evidence) ● Creating video

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