UNIVERSITI TEKNOLOGI MALAYSIA

SUBJECT : TECHNOLOGY AND INFORMATION SYSTEMS (SECP 1513)

SECTION : 03 PULAU PINANG SPACE

TASK : DESIGN THINKING

TOPIC : BIG DATA AND ARTIFICIAL INTELLIGENT NEW INNOVATION

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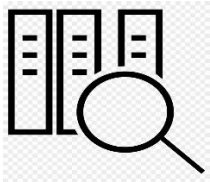
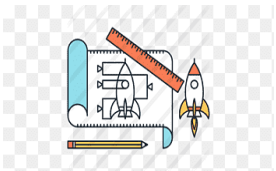
TABLE OF CONTENTS

1 INTRODUCTION

Teams use design thinking, a non- linear, iterative process, to comprehend users, question presumptions, reframe issues, and develop creative prototype and test solutions. In every industry, including business, science, the arts, and more, this procedure has been widely used. Its primary goals are meeting human needs and wants and making work easier for people. In order to come up with a solution that will satisfy their needs, designers and inventors will collaborate. The five phases of this approach. Empathize, Define, Ideate, Prototype, and Test are most effective when applied to problems that are unclear or unidentified.

Empathize 	The first step in Design Thinking is empathy. It plays a significant part in design thinking since it enables developers to better comprehend the needs of the client and obtain new insights that aid in the development of an appropriate solution. An interview will be necessary because this step entails speaking with and consulting with clients and experts. The knowledge acquired will help the developers come up with a workable solution.
Define 	A precise problem statement is established during the Define stage. Developers will examine and observe the issue to determine the primary issue after compiling all of the data from clients and experts during the empathy stage.
Ideate 	At the ideation stage, creativity is most important. Many concepts are generated as the developers begin to think creatively and examine the issue from a variety of angles in order to come up with a solution. Mind mapping and brainstorming are very beneficial at this point.
Prototype 	It's an experimental stage. The goal is to determine each problem's optimal solution. The team experiments with the concepts by creating low-cost, simplified versions of the product (or features included in the product). After investigating the model,

	developers will be able to identify the best solution for the problem and have a better understanding of how the end product will work.
Test 	The team uses actual users to test these prototypes to see if they address the issue. The team may decide to improve the prototype or even return to the Define stage to reexamine the issue in light of the test's potential to yield fresh insights. Nevertheless, issues could come up at this point. Changes are then made to address the five issues and produce the ideal finished product.

Table 1:5 Steps of design thinking

Big data are the big improvement for human and in this new era, the term "big data" describes the amount, speed, and diversity of data that artificial intelligence tools use to find correlations and patterns in enormous data sets.

2 DETAILED STEPS

One of the topics assigned to develop a prototype was big data and artificial intelligence. In our group, there has been ongoing discussion. This led us to the conclusion that the majority of students stopped pursuing higher education due to the challenges of the tasks and assignments, their lack of recognition, and their lack of confidence in their ability to write reports. To address this issue, we attempted to use the Design Thinking methodology.

2.1 Empathize

Researching the advantages of artificial intelligence (AI) in the modern world was the first action we took. Big data made a significant contribution to this subject that we can all identify with. Since the lecturer and other groups provided us with information and insights on these topics, our group's research and discussion allowed us to determine the

issues that the majority of student faced. Our next step has been greatly aided by the information we learned from this interview alone.

2.2 Define

On define stage, we have been discussing the information gathered from the research and together through WhatsApp. In our conversation, we overstated the main problems with AI and big data. Thus, using the information and opinions of the majority that we gather, we were able to identify three issues.

2.3 Ideate

During the ideate stage, we already have a clear problem statement after listing and categorizing the problems from the last stage. To come up with a new solution to the issue, we decided to host an online meeting and come up with filtered and reduced ideas as we circulated them to choose the most effective way to solve the issue. Key features of this are Learning Support (without Dependence), Critical Thinking Prompts and Creativity Booster.

2.4 Prototype

In this stage, we agreed to create a rough prototype which is a website named “AI Companion: Safe and Mindful Learning Platform” after we were compiling all our ideas. The prototype aims to help students use AI as a learning tool while fostering independent thinking, creativity, and data privacy awareness. Based on the issues and knowledge we acquired, we came up with these concepts, and the prototype included the fixes. We divided the work amongst ourselves and created the prototype after determining the features and functions.

2.5 Test

This prototype test phase marks the final completion of our prototype design. With that, we decided to ask one of the students to help us to test the prototype so we can examine

its functions and features. The system can generate prompts that help students break down complex questions, analyse problems, and form their own conclusions before seeing AI-generated insights.

For future reference, we have compiled all of the aforementioned design thinking process steps into a video, which can serve as proof of our work.

3. DETAILED DESCRIPTIONS (PROBLEM, SOLUTION & TEAM WORKING)

3.1. PROBLEM

During our discussion, we explored the potential risks of AI and big data innovations, particularly focusing on bias and discrimination. We began by highlighting that, although AI has the potential to transform society, its use by governments and enterprises could negatively impact human rights. One of the concerns raised was the issue of over-dependence on AI. We discussed how students might rely too much on AI, which could hinder their independent thinking. For example, if students use AI to complete assignments, they may not fully grasp the subject material, which could affect their learning outcomes. We also talked about how AI usage could lead to a decline in critical thinking skills. Several participants noted that critical thinking is essential for analyzing information and making decisions. If students depend on AI for answers, they may struggle to evaluate information properly. Another point raised was limited creativity. Since AI often provides standardized responses, it may prevent students from thinking outside the box. We discussed how students using AI for writing or brainstorming might miss out on opportunities to develop original ideas. Lastly, we delved into data privacy concerns. Many AI tools require personal information to function, and Intan shared her concern about free AI tools. She pointed out that students might unknowingly provide personal data, which could then be sold or misused, leading to potential privacy violations. This sparked a conversation on the importance of being cautious about what information is shared when using AI tools.

3.2. SOLUTION

After defining all the problems, a brainstorm process is then carried out to find suitable ways and solutions to solve these problems. First analytical techniques, students require meticulous assessment of the training data for sampling bias and unequal representations of groups in the training data, they can investigate the source and characteristics of the dataset. Check the data for balance. Second, develop critical thinking skills, students should focus on developing critical thinking and problem-solving skills, rather than just relying on technology to solve problems. Third, students should use AI to support teaching, and AI should be used to support teaching, rather than replace it. Forth, Students also need ensure transparency and accountability: AI systems should be transparent and accountable, and students should be able to understand how they are being evaluated. Lastly, address bias and discrimination, AI systems should be designed to address bias and discrimination, and students should focus on developing inclusive and equitable learning environments

3.3 TEAM WORKING

To ensure the smooth progress of our project, we began by discussing and agreeing to appoint a group leader. Through a voting session, we unanimously selected Iqbal as our leader. We then initiated our discussion on the topic, focusing on innovations in big data and artificial intelligence. During our first session, we conducted research and exchanged ideas. We applied the five phases of the design thinking concept—empathize, define, ideate, prototype, and test—to tackle the problem. After gaining a clear understanding of our topic, we formulated questions for the interviewer. Thanks to our teamwork and collaboration, we were able to ask essential questions and receive valuable answers. During the ideation phase, every team member contributed ideas on how to solve user challenges. We gathered our ideas in a Webex discussion and documented them in Google Docs to find the best solution. For report writing, we divided the tasks: Athirah wrote the introduction and steps, Intan covered the detailed description (including problems, solutions, and teamwork), and Iqbal worked on the design thinking assessment and evidence. Next, we entered the prototype phase by

meeting again on Webex to create a prototype using an app. To save time, we divided the prototype-building tasks into smaller parts and then combined them. Finally, we reviewed the prototype together to identify potential improvements. I feel grateful and appreciative that tasks were distributed fairly, and each member gave their best effort. We also supported each other in solving challenges beyond our assigned tasks, which strengthened our collaboration and ensured project success.

4. DESIGN THINKING ASSESSMENT

During the design thinking process, we collected various information and generated different ideas. Assessment played a crucial role in ensuring we stayed aligned with our original problem statement. This involved evaluating and analyzing the problem to confirm that the solution provided addressed it effectively. In the initial empathize phase, we focused our topic on the challenges encountered during using AI. To gain insight into these issues, we decided to research an expert proficient. We conducted interviews with students to identify common challenges they faced. Next, we entered the defined phase, where we analyzed the problem statements shared by the student. After conducting our own research, we categorized and documented the identified issues. In the ideate phase, we brainstormed potential solutions for the problems identified in the defined phase. At this stage, assessment became essential to filter out impractical or unrelated ideas. By the end of this phase, we reached a consensus on the best solution to pursue. Finally, we moved to the prototype phase, where we developed a website based on our chosen solution (prototype)

5. DESIGN THINKING EVIDENCE

- The sample demonstrate by students of design thinking in AI and Big Data, we can examine student projects, phase records, and user research.

Based on our research, we found that students working on AI and Big Data Projects follow the design thinking process to solve real-world challenges. They research user problems, brainstorm solutions, develop AI prototypes, and test them for improvement.

- Record for each phase

5.1. **Empathy**:

Students conduct user research by interviewing potential users to identify pain points. Here is a list of questions:

1. What challenges do you face in handling large amounts of data?
2. What features would help you use AI effectively?
3. How do you currently use AI in your learning process?
4. Do you feel too dependent on AI when studying? Why or why not?
5. What difficulties do you encounter when trying to think creatively?
6. How concerned are you about data privacy when using AI tools?
7. What measures do you take to protect your personal data online?
8. How would you like AI to assist you without replacing independent thinking?
9. What frustrates you most about existing AI-powered learning platforms?
10. What improvements would make AI-based learning more engaging and effective for you?

5.2. **Define:**

In this define stage, we retrieved the problems from our research and discussing through WhatsApp. In this part we discuss the problems AI and Big Data. We did some research to find problems, then came up with main problems which are learning support in AI is the risk of over dependence. AI powered education tools provide instant answers and guidance, but excessive reliance on them can reduce critical thinking and problem-solving skills. Learners may struggle to develop independent learning habits if they always depend on AI for solutions. Another challenge is AI's

impact on **creativity**. While AI can generate ideas and assist in creative tasks, it often follows patterns and lacks true originality. This can lead to a decline in human creativity if people rely too much on AI-generated content instead of developing their own ideas. Lastly, **data privacy protection** is a major concern with Big Data. AI systems collect and analyse vast amounts of personal information, increasing the risk of data breaches and misuse. Without strong security measures and ethical data handling, sensitive data can be exposed or used without consent, leading to privacy violations.

5.3. Ideate:

In this phase, AI and Big Data bring many benefits, but they also create challenges. One issue is **learning support without dependence**. AI tools help with education, but too much reliance on them can weaken problem-solving skills. Learners should use AI as a guide rather than a replacement for independent thinking. Another problem is **creativity**. AI can assist in generating ideas, but it often follows patterns and lacks originality. Overusing AI may reduce human creativity and innovation. Lastly, **data privacy protection** is a big concern. AI collects large amounts of personal data, which can lead to security risks if not properly protected.

To solve these issues, AI should be designed to **support learning without making users dependent**, encouraging critical thinking and self-study. For creativity, AI should be used as an **idea booster**, helping humans brainstorm rather than replacing original thought. To protect privacy, **strong security measures** such as encryption and strict regulations must be in place. Educating users on data protection will also help keep personal information safe. These solutions can help balance the benefits of AI while reducing its risks.

5.4. Prototype:

In the prototype phase, we developed a website called **"AI Companion: Safe and Mindful Learning Platform"** to address the issues identified. The platform helps students use AI as a learning tool while promoting independent thinking, creativity, and

data privacy awareness. After compiling our ideas, we designed the prototype to include solutions for these challenges. We divided tasks among our team, determined key features, and built the prototype to ensure effective functionality.

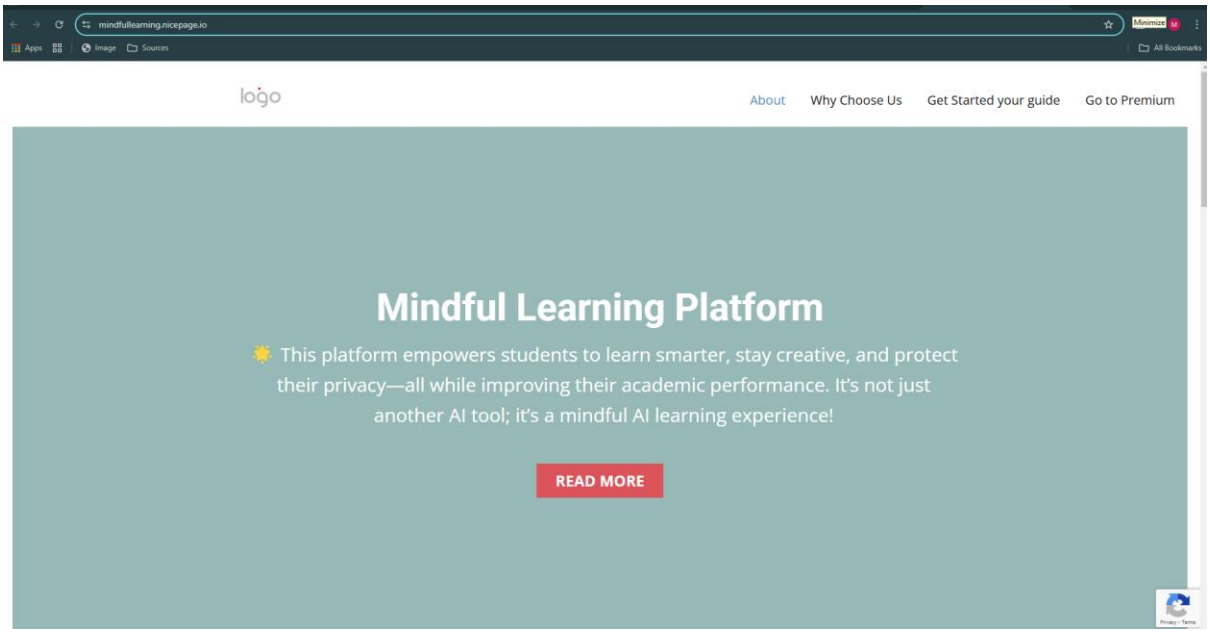


Figure 1: homepage phase

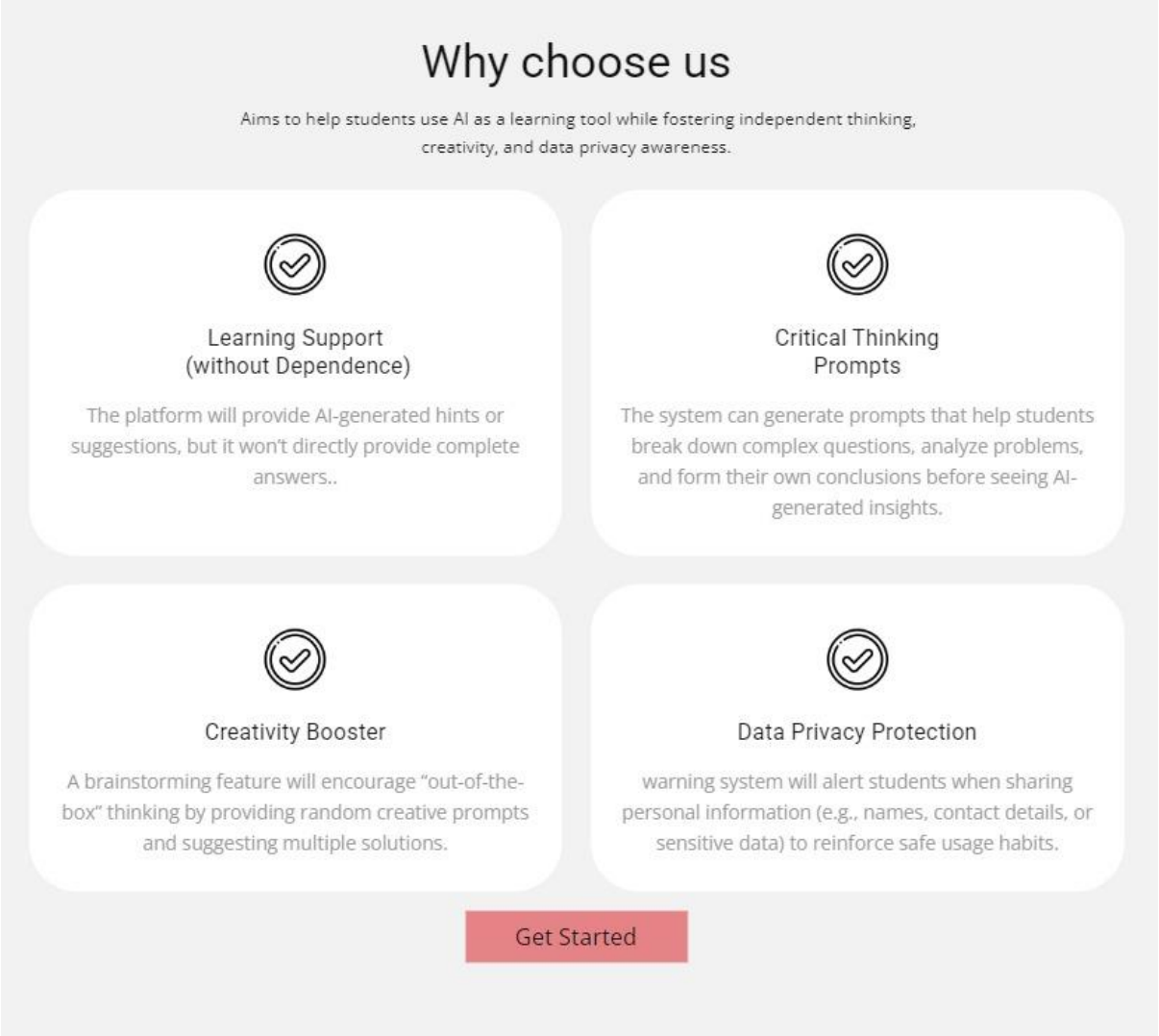


Figure 2: features phase

5.4.1. Prototype Test:

In the final phase, we tested our **AI Companion: Safe and Mindful Learning Platform** to evaluate its features and functionality. We ask one of the students to test the system and provide feedback. The platform successfully generated prompts that guided users in breaking down complex questions, analyzing problems, and forming their own conclusions before accessing AI-generated insights. This ensured that the system supports learning without dependence while encouraging critical thinking and data privacy awareness.

The link below is our session with him:

https://mindfullearning.nicepage.io/

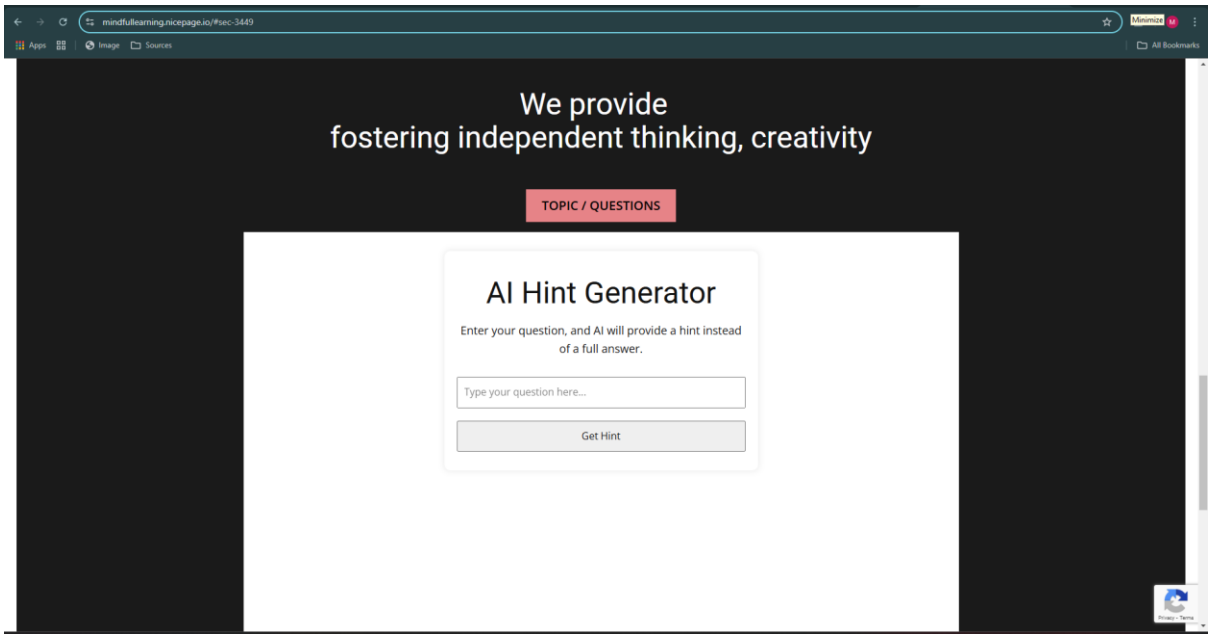


Figure 3: question phase

6. TASKS FOR EACH MEMBERS

- **ATHIRAH NABIHAH BINTI ISHAK**

Tasked with writing the Introduction and Detailed Steps sections of the report. Additionally, involved in making video, including recording and presenting, to enhance the clarity and engagement of the content.

- **INTAN NORSUHADA BINTI AMRAN**

Tasked with writing the Detailed Description, Design Thinking Assessment created **AI Companion: Safe and Mindful Learning Platform** sections of the report. Additionally,

involved in video production, including editing, recording, and presenting, to improve clarity.

- **MUHAMMAD IKQBAL BIN NORDIN**

Tasked with writing the Design Thinking Evidence section. Additionally, assigned tasks to each team member and participated in video production, including recording, prototype development, and presenting, to enhance the clarity and engagement of the content.

Reflection:

- **INTAN NORSUHADA BINTI AMRAN**

Throughout our project, I gained valuable insights into teamwork, problem-solving, and the structured use of design thinking principles. Identifying key challenges such as AI bias, overdependence, limited critical thinking, and privacy concerns deepened our understanding of AI's risks and limitations.

Our strong collaboration, facilitated by clear communication and fair task distribution, was essential to our success. The application of design thinking phases in empathize, define, ideate, prototype, and test helped us systematically tackle problems and refine our solutions. I also developed critical skills, including research, communication, and technical abilities, which strengthened our overall project approach. Although more time for prototype testing and feedback would improve future projects, I am proud of our teamwork and solution development. This experience has prepared me for future collaborative challenges with greater confidence and adaptability.

- **MUHAMMAD IKQBAL BIN NORDIN**

My goal in this Software Engineering program is to develop strong skills in AI and Big Data to create smart and useful solutions. I want to master machine learning, data analytics, and automation to help industries improve efficiency and decision-making. In the future, I hope to work on AI innovations or even start my own AI-driven business.

Design thinking has changed how I approach problem-solving. Instead of just focusing on coding, I now prioritize understanding user needs, brainstorming solutions, and improving through feedback. It has also helped me develop better teamwork and communication skills, which are crucial in AI development.

To improve my industry potential, I plan to strengthen my technical skills by learning AI frameworks like TensorFlow and Big Data tools like Apache Spark. I will gain hands-on experience through projects, competitions, and internships while staying updated with certifications and networking. Most importantly, I want to build ethical and responsible AI solutions that make a real impact.

- **ATHIRAH NABIHAH BINTI ISHAK**

My ultimate goal in pursuing this program is to gain the knowledge, skills, and experiences necessary to excel in my chosen industry. I aspire to not only master the theoretical foundations but also to apply them in real-world scenarios. Whether through innovation, leadership, or specialized expertise, I want to contribute meaningfully in future.

This design thinking assignment has very much impacted my ways of solving a problem. I will have the most efficient ways to solve my clients' problems following the five design thinking phases: empathize, define, ideate, prototype and test. This assignment gives me a very good platform to perform these 5 phases of design thinking and I gain so much experience from it.

By implementing this plan, I will be better prepared to achieve my dreams and make a lasting impact in my industry.

References:

Sally Almanasra From the journal, Journal of Intelligent Systems

https://doi.org/10.1515/jisys-2024-0237

https://www.interaction-design.org/literature/topics/design-thinking