Group Report Project

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Assignment Title : Design Thinking Project is: Future Digital

Group Topic/Name : Transforming Classroom Learning Through XR

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In submitting this work for grading, we confirm:

- That the work is original, and due credit is given to others where appropriate.

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1. INTRODUCTION

Design Thinking is a human-centred approach used to solve problems creatively by understanding user needs and testing solutions through iterative processes. In the education sector, traditional classroom learning often relies on textbooks, slides, and lectures, which may limit student engagement and understanding, especially for complex or abstract topics.

Extended Reality, or XR, is an umbrella term that includes VR, AR, and MR. XR technologies blend the physical and digital worlds to create immersive experiences. VR immerses users in a completely virtual environment, AR overlays digital information onto the real world, and MR combines elements of both VR and AR, allowing for interaction with digital and physical objects.

XR is crucial in education because it enables new ways of learning that traditional methods cannot offer. By creating engaging and interactive experiences, XR helps students understand complex concepts, retain information better, and develop critical thinking skills. The immersive nature of XR makes learning more enjoyable and effective.

This project aims to transform the traditional classroom into an XR learning environment using the Design Thinking approach to improve student engagement, understanding, and learning outcomes.

2. DESIGN THINKING PROCESS

2.1 Empathize Phase

Based on the data from survey that was done, a significant proportion of respondents indicate that too much theory, not enough visualization is the challenge that they face the most in the class particularly among students, accounting for 42.1% of responses, indicates that many students struggle to understand concepts when the explanation is text-based without visualization. Additionally, 31.6% of students reported difficulty maintaining focus during lectures because of monotonous teaching styles that reduce engagement and concentration, and 15.8% felt that the concepts are too abstract, showing the clearer concrete examples and explanation. Meanwhile, 10.5% experienced limited interaction with the lecturer, which showed limitation on opportunities to ask questions or clarify misunderstanding. These findings highlight a learning environment where students need more interactive, visual, and engaging teaching methods to enhance their understanding and sustain attention.

When asked about their struggles with abstract or complex topics, most students expressed some level of difficulty. About 63.2% of our respondents sometimes struggle with these topics, while 26.3% respondents reported to be struggling very much, showing that complex content poses a significant learning barrier for most students. Only 10.5% stated that they do not really have difficulty in understanding the topics, and none select ‘never’, suggesting almost all students encounter challenges at some point. This reflects a common need for fully grasp, step-by-step guidance, and supportive learning tools to help students visualize and process complex information. This emphasizes the importance of instructional strategies that simplify abstract concepts and learning support to improve students' understanding and confidence.

2.2 Define Phase

The survey found that even though students show strong interest in adopting XR technology for classroom learning, the current learning environment lacks sufficient immersive and visual tools to support understanding complex concepts. Features such as 3D visualization, virtual simulations, and interactive problem-solving are strongly valued by students because it is highlighted by a clear need for more engaging and experiential learning approaches. It is also suggested that learning solutions must be flexible enough to accommodate different learning styles as the diversity in preferred features. Therefore, the key problem identified the absence of an integrated XR-based learning system that can enhance engagement, improve concept understanding, and provide meaningful interactive learning experiences in a structured and accessible manner.

While the surveys show the overwhelming positive answers that Intelligent XR can enhance learning effectiveness, several constraints limit its practical implementation. The various concerns related to Intelligent XR such as cost, accessibility, technical issues, distractions, inaccurate information, and proper conduct indicate the need for a solution that balances innovation with dependability. The main challenge in this is designing an Intelligent XR learning platform that delivers measurable educational benefits while remaining affordable and reliable to everyone. Addressing these constraints is important to ensure long-term integration and maximize the positive impact of XR technology in an educational setting.

2.3 Ideate Phase

This ideates phase focuses on generating wide range of possible solutions based on the problem defined in the previous stage. The goal is to explore innovative ideas that can address students' learning challenges in the classroom.

During the ideation phase, brainstorming was conducted among group members to generate possible solutions. Each member contributes ideas based on their own learning experiences, observation from the empathy phase and exposure to digital learning technologies. Group discussions were used to encourage creative thinking.

Ideas that our group member are considering are:

- XR visualization tools in classroom
- Virtual learning environment
- Interactive student engagement

Each idea was rated and discussed by team members. After evaluating feasibility, cost and impact toward the learning, our team selected XR visualization tools in classroom.

The final idea chosen combines:

- 3D learning object for concept visualization
- Teacher-controlled XR content delivery
- Student-centered interaction and colloboration

The solution was selected because it's:

- ◊ Support different style of learning
- ◊ Can be adapted to various subject
- ◊ Enhances learning without replacing traditional teaching

The ideate phase concluded a clear direction for developing a prototype that represent the XR classroom concept.

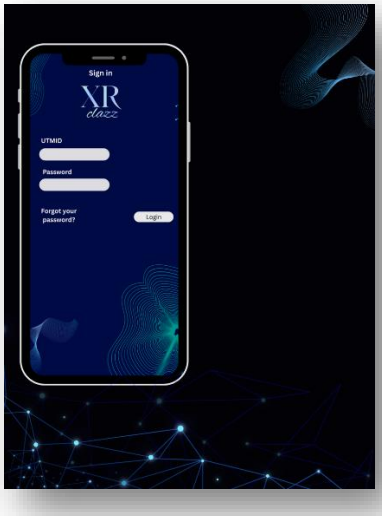
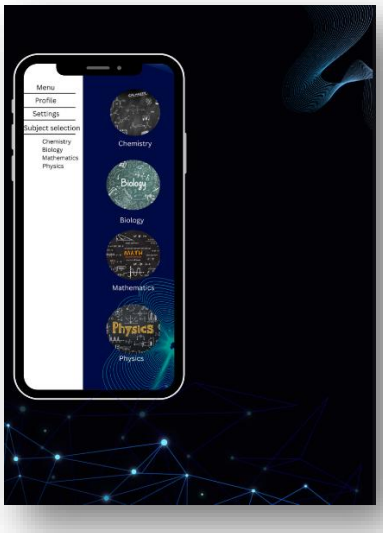
2.4 Prototype Phase

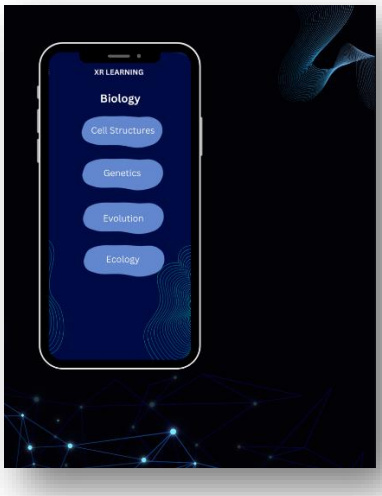
- Objective Prototype
  The prototype was created to visualise the suggestion of System Intelligent Extended Reality (XR) Classroom aimed at enhancing students' engagement and understanding during classroom learning. This prototype is non-functional and developed without any programming. We only focusing only on visual design and use interaction.

- Tools and Approach
  This prototype was designed using Canva to simulate a realistic user experience of the system. The design was based on the problems identified earlier in the Empathy and Define phases. From the survey, many students had difficulty understanding the topics because there is too much theory, not enough visualization and difficulty maintaining focus during lectures because of monotonous teaching styles that reduce engagement and concentration. Therefore, the prototype aims to support learning through interactive and visual XR elements.

- User Flow Explanation
  The system starts with homescreen, followed by login screen, the students need to enter their UTM ID and password to login. Then, a dashboard that shows the selection of subjects and XR learning modules. Students can select a module to enter an XR-based learning environment where the concepts are presented in a more visual and interactive way. After completing the session, a summary screen will be displayed to help students review what they have learned during the class session.This will help the students to jot down notes.

- Design Justification
  The conclusion is the interface was designed to be simple and easy to use. XR visuals were included to help students better understand difficult concepts. This prototype also help the lecturers to identify students who are absent from class and students who are not paying attention in class.This prototype demonstrates how XR technology can improve classroom learning by making lessons more engaging and interactive.

	The design was exclusively made by the team to enhance the look of the prototype. The colour was chosen was carefully selected to gives more futuristic vibes.
	First, students are required to login their UTM ID and password to be able access the XR CLAZZ application. Once the login has made, the apps will bring student to the main page of the apps.
	The front page will show many kinds of selection button, including Settings, Menu, Profile and Subject Selection.

	Once a subject is selected, it will bring the user to the selection of topics that the user wants to select. The selection topic consists of various topics that user can be refer to.
	After completing the class session, the summary will be displayed to help students review what they have learned during the class session.

2.5 Test Phase

The prototype was evaluated through structured testing sessions involving representative target users to assess its usability, functionality, and overall effectiveness in addressing the identified problem. Participants were instructed to interact with the prototype by completing predefined tasks that reflected real usage scenarios. Observations were conducted to identify user interactions, challenges encountered, and system performance. User feedback was collected through interviews and questionnaires to obtain qualitative and quantitative insights. The findings from the testing phase were systematically analyzed and used to inform necessary refinements, ensuring the prototype met user requirements and achieved the intended objectives.

User Feedback:

Person 1	Student
Name	Amir
Age	21
Feedback:	The idea of using XR in the class itself interesting. The simple design of the apps is perfect for all age and from various field. I believe this apps would help me in my study as it's provided a lot of material and helpful 3D models. I guess that's the only things that I could say from this app.

Person 2	Lecturer
Name	Amarah
Age	45
Feedback:	This app should be created soon and be implement in real life! When I heard the idea of this app, I feels like this could less burden for us lecturers to help student to understand certain part of the topics. 3D models and summary of what we learnt could certainly help students. I'm pretty much sure if 'slow' students could benefit in it as this app allow us to access on any classes to do revisions.

3.PROBLEM, SOLUTION AND TEAMWORK

Problem

- Traditional classroom lack immersive and interactive learning experiences, making it difficult for students to fully understand abstract concepts.

Solution

- The proposed XR classroom allows students to interact with 3D objects, easily visualize learning lessons, and improving learning effectiveness.

Teamwork

- Team members collaborated through regular discussions, brainstroming sessions and task delegation. Cooperation and communication ensured smooth progress throughout the project.

4.DESIGN THINKING ASSESSMENT POINTS

The Empathize phase aimed to understand students' learning experiences and challenges in the classroom. Survey results reveal that many students feel overwhelmed by theory-heavy lessons with limited visual support, making it difficult for them to grasp key concepts. A large portion of students also reported losing focus during lectures due to monotonous teaching styles, which affects their engagement and concentration. Others expressed frustration with abstract concepts that lack clear, concrete examples, as well as limited opportunities to interact with lecturers and clarify misunderstandings. These challenges indicate that students need clearer explanations, step-by-step guidance, and more visual and interactive learning approaches to help them better understand content and feel more confident during lessons.

The survey findings identify a gap between students' interest in XR-based learning and the lack of immersive and visual tools in the current classroom environment. Students value interactive features such as 3D visualization and virtual simulations to better understand complex concepts and support diverse learning styles. However, concerns related to cost, accessibility, and technical reliability limit the adoption of Intelligent XR. Therefore, the key problem is the absence of an affordable, reliable, and integrated XR learning system that can enhance engagement and improve students' understanding in a structured and accessible manner.

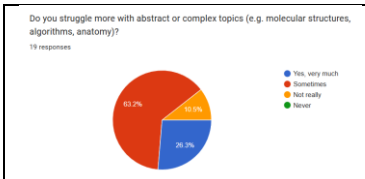
The Ideate phase focused on generating potential solutions to address students' learning challenges. Group brainstorming was conducted using insights from the Empathize phase, personal learning experiences, and knowledge of digital learning technologies. Ideas considered included XR visualization tools, virtual learning environments, and interactive student engagement approaches. After evaluating feasibility, cost, and impact, the team selected XR visualization tools for the classroom. This solution integrates 3D learning objects for concept visualization, teacher-controlled content delivery, and student - centred interaction. It was chosen because it supports diverse learning styles, can be applied across subjects, and enhances learning without replacing traditional teaching. The Ideate phase provided a clear direction for developing a prototype of the XR classroom concept.

The prototype visualizes the proposed Intelligent XR Classroom to enhance student engagement and understanding. It is non-functional, focusing on visual design and interaction using Canva. The prototype incorporates interactive XR elements to help students understand complex concepts and maintain focus. The user flow includes a login, dashboard with subjects and XR modules, an XR learning environment for interactive lessons, and a summary screen for reviewing learning outcomes. The design is simple and user-friendly, supporting diverse learning styles while allowing lecturers to monitor attendance and engagement. This prototype demonstrates how XR technology can make classroom learning more interactive and effective.

In the Test phase, the developed prototype was presented to the target users to evaluate its usability, functionality, and overall effectiveness in addressing the identified problem. Users were invited to interact with the prototype and complete specific tasks while observations

were made on their behaviour, difficulties, and responses. Feedback was collected through user comments, short interviews, and questionnaires to understand their experience, satisfaction level, and suggestions for improvement. The testing results helped the team identify strengths, weaknesses, and areas that required refinement. Based on the feedback received, necessary improvements were proposed to enhance the prototype and ensure it better meets user needs and expectations.

5.DESIGN THINKING EVIDENCE

<table>
<tr>
<td> 
</td>
<td>EMPATHIZED PHASE

A survey was conducted with the main purpose to understand user deeply by seeing problems from their perspective rather than making assumption.

A. The question and answer:

Q1: Which challenges do you face most in class?
Answer: Concepts are too abstract, too much theory, not enough visualization, hard to stay focused during lectures, limited interaction with lecturer and learning pace not suitable

Q2: Do you struggle more with abstract or complex topics (e.g. molecular structures, algorithms, anatomy)?
Answer: Yes, very much, sometimes, not really and never

Q3: Would you be interested in learning using XR (AR/VR) technology in class?
Answer: Very interested, interested, neutral and not interested

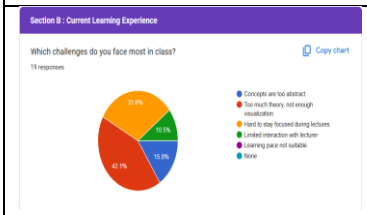
Q4: Which XR features would benefit your learning most?
Answer: 3D visualization of concepts, virtual lab / simulation, step-by-step guided learning, interactive problem solving, and real-time feedback

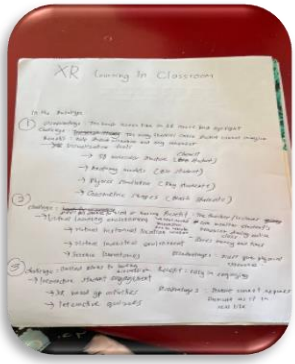
Q5: Do you think Intelligent XR can improve learning effectiveness?
Answer: Strongly agree, agree, neutral, and disagree

Q6: What concerns do you have about using XR and AI in education?
Answer: Cost, accessibility, technical issues, distraction, no concerns, inaccurate information, and proper conduct

Q5: Would you recommend this system if implemented in your institution?
Answer: Yes, maybe, and no

B. Composite character</td>
</tr>
</table>

	Nickname: Ain **Age:** 20 years old **Education level:** Undergraduate student **Field of study:** Medical health **Background:** Ain attends lecture-based classes that rely heavily on theoretical explanations with limited visual support. While she is motivated to succeed, she often finds it difficult to understand abstract or complex topics and struggles to stay focused during long lectures. **Goals:** To understand complex concepts clearly **Challenges:** Abstract concepts without visualization **Needs:** Visual and immersive learning tools **Attitude Toward XR:** Ain is interested in using XR technology in learning and believes features such as 3D visualization and virtual simulations can help her better understand difficult concepts, provided the system is affordable, reliable, and accessible
	DEFINE PHASE In this phase, the insight from the empathized phase were analysed and synthesized to clearly identify the core problem. The group organized user data to uncover, pattern, key needs, and pain point. Here the data gain: • Students need visual representations of abstract concepts because theory-heavy lessons make understanding difficult. • Students need interactive learning tools because monotonous lectures reduce engagement and focus. • Students need step-by-step guidance for complex topics because they struggle to grasp abstract content independently. • Students need opportunities to interact with lecturers because limited class interaction prevents clarification of misunderstandings. • Students need XR-based learning modules because immersive and visual tools can improve comprehension and engagement. • Students need affordable, accessible, and reliable XR solutions because cost, technical issues, and accessibility concerns could limit adoption. • Students need feedback and progress tracking because they want to review and retain what they learned

	effectively.
	IDEATE PHASE Brainstorming was conducted among group members to generate possible solutions. Each member contributes ideas based on their own learning experiences, observation from the empathy phase and exposure to digital learning technologies.
	IDEATE PHASE The final idea was chosen after considering the pros and cons of the possible solution based on users' needs. The selected solution was based on the feedback given by students' perspectives.
	PROTOTYPE PHASE This design was discussed among the members to look attractive and user-friendly. We discuss about what to conclude in the app.

6.REFLECTION

- ☺ Faiqah Hadirah

The ideate phase helped our group generate and refine ideas to solve problems in traditional classrooms, such as low student engagement and difficulty in understanding abstract concepts. Through brainstorming and discussion, we explored various solutions and selected Extended Reality (XR) in the classroom as our final idea.

Overall, this project improved our understanding of the design thinking process and the importance of user-centred solutions. Working as a team strengthened our communication and collaboration skills. The project also highlighted the potential of XR technology to enhance education and transform learning experiences. It was a valuable learning experience that developed our creativity, problem-solving, and teamwork abilities.

☺ Najwa Najibah

My goal in my course is to develop strong theoretical knowledge and practical skills that are relevant to industry needs, so that I can confidently apply what I learn to real-world problems after graduation. Through the design thinking process, especially the Empathize and Define phases, I learned the importance of understanding real user needs and clearly defining problems before creating solutions. This experience strengthened my critical thinking, problem-solving, and creativity skills, which directly support my academic goals and future career aspirations.

To improve my potential in the industry, I plan to continuously enhance both my technical and soft skills. This includes gaining hands-on experience through projects, learning emerging technologies such as XR, and applying user-centered design approaches in problem solving. By improving my communication, teamwork, and adaptability, I aim to become more industry-ready and capable of contributing effectively in a professional environment.

☺ Hanisah Husna

During the prototype phase, we find that translating ideas to visual design is more challenging than expected. While our initial concept of an Intelligent XR classroom was clear, turning it into a simple and understandable interface required several adjustments. We realised that a good idea alone is not enough if users cannot understand how to use the system. One of the main challenges was deciding what to include in the prototype.We had to focus more on user flow and clarity of each screen rather than technical features, since the prototype does not use any programming. We tried to design prototype in a way that could help students learn more effectively.

For me, this phase helped us to see our project in more realistic way while the design looks attractive, easy and user-friendly. It helped us appreciate the value of prototyping to test ideas early and improve them before moving forward because we want to give our best for the users. In addition, we had to discuss about the design and the pros and cons of this prototype and agree on decisions together, as the process of building and reviewing the prototype that improved our teamwork and communication.

7.TASK EACH MEMBER

NUR FAIQAH HADIRAH BINTI JEFFRI	• Construct the Ideate Phase for the solution • Introduction • Problem, solution and teamwork • Reference
NAJWA NAJIBAH BINTI MOHAMAD NOR	• Create and conducting survey for problem. • Analysed the survey for empathized phase • Uncover pattern of user needs during define phase. • Test phase in the report • Design thinking assessment point
NUR HANISAH HUSNA BINTI NOOR AZLIZAN	• Do the design app for prototype phase • Testing the prototype with the user • Conclusion

8.CONCLUSION

In conclusion, this project allowed us to explore how Intelligent Extended Reality (XR) can be used to improve classroom learning in a future digital campus. Through the Design Thinking process, we use online platform like google form to collect data based on students experience. We were able to better understand the challenges faced by students and lecturers in traditional classroom settings, especially when learning complex and abstract topics. One of the problems is, students had difficulty understanding the topics because there is too much theory, not enough visualization and difficulty maintaining focus during lectures because of monotonous teaching styles that reduce engagement and concentration.

While working on this project, we realise the importance of focusing on users from the beginning instead of jumping straight into solutions. Designing the non-functional prototype allowed us to turn our ideas into something more interactive and will help students and lecturers to study in more effective way. This prototype clearly shows that students will understand the modules more effectively. This clearly shows how XR could make learning more engaging, fun and interactive.

This project was also a valuable learning experience for our group. It improved our teamwork, communication, and ability to think critically about design choices, we had to discuss about the design and the pros and cons of this prototype and agree on decisions together. Most importantly, this experience has given us useful insights into how future digital campuses can be designed in a more meaningful and user-centred away.

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