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AI-Powered Personalized Mobile Education for New Zealand Students

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ABSTRACT

This research endeavors to develop and assess a customized mobile education system for students in New Zealand, employing the principles of artificial intelligence (AI) and user-centered design (UCD). The objective is to overcome the limited personalization observed in current mobile education solutions by offering tailored learning content and recommendations based on individual preferences, thereby accommodating the diverse requirements of students. A mixed-methods approach will be utilized, encompassing user research, persona development, user journey mapping, design, development, and evaluation. Participants, including New Zealand students, parents, and teachers, will actively engage in multiple research phases to ensure the effective implementation of user-centered design principles. By showcasing the potential of AI-driven personalization in enhancing the learning experience for students, this study contributes to the growing utilization of AI algorithms and systems within the educational context.

1. INTRODUCTION

Over the years, mobile education has gained immense popularity as a mode of learning, particularly among the younger generation. It provides various benefits, including accessibility, flexibility, and convenience, and has the potential to enhance student engagement and motivation (Al-Hamad et al., 2021).

Unfortunately, despite its benefits, many mobile education solutions still lack personalization, making it difficult to cater to the diverse needs of students. Personalization is crucial in mobile learning as it allows learners to receive customized content and recommendations that align with their individual learning preferences and needs (Mcconatha et al., 2008).

To address the need for more personalized and effective mobile learning solutions, this research project proposes to design and evaluate a personalized mobile education system for New Zealand students that leverages the power of artificial intelligence (AI) and is informed by user-centered design (UCD) principles. AI-powered personalization has the potential to provide students with personalized learning experiences that are adaptive, responsive, and engaging. UCD principles, on the other hand, can ensure that the design of the mobile education system is user-friendly, intuitive, and meets the needs and expectations of its target audience (Krull and Duart, 2017).

The purpose of this research project is to design and evaluate a personalized mobile education system for New Zealand students that leverages the power of artificial intelligence (AI) and is informed by user-centered design (UCD) principles. The project aims to address the need for more personalized and effective mobile learning solutions that meet the unique needs and preferences of New Zealand students.

2. LITERATURE REVIEW

In recent years, mobile education has become an increasingly popular mode of learning, especially among younger generations. However, many mobile education solutions lack personalization and fail to meet the diverse needs of students. AI-powered personalization has the potential to address these issues by providing tailored learning content and recommendations based on each student's individual needs and learning preferences (Mohtar et al., 2022).

UCD principles are also important for the success of a mobile education system. By involving users in the design process and gathering feedback throughout the development cycle, we can ensure that the final product meets the needs and expectations of its target audience (Asmar, 2022).

The mention of a supercomputer recalls a machine with immense processing capabilities and adaptive behavior, including the incorporation of sensors and other features that enable it to exhibit human-like cognition and functional abilities. This, in turn, enhances its interaction with humans (Goralski and Tan, 2020). The depiction of AI's capabilities has been showcased in different motion pictures, such as in smart buildings where AI can manage air quality, temperature, and play music depending on the occupants' mood (Akour et al., 2022).

The education sector has also witnessed an increasing application of artificial intelligence beyond the conventional understanding of AI as a supercomputer. AI is now embedded into robots, AI systems, and supporting equipment to create robots that enhance the learning experience, starting from the most basic unit of education, which is early childhood education. Cobots, which refer to robots that work together with teachers or colleague robots, have been deployed to teach children routine tasks such as spelling and pronunciation while adapting to their abilities (Dai and Ke, 2022).

Additionally, web-based and online education has transitioned from the simple provision of materials for students to download, study, and complete assignments to include intelligent and adaptive web-based systems that learn instructor and learner behavior to adjust accordingly and enrich the educational experience (Deka, 2015). Artificial intelligence has been incorporated into administration, instruction or teaching, and learning, according to Chassignol et al., forming the framework for analyzing and understanding artificial intelligence in education (Alhamad et al., 2012).

A personalized mobile education system is an innovative solution that aims to revolutionize the traditional education system by leveraging the power of technology to provide adaptive and personalized learning experiences to students. It combines the convenience and flexibility of mobile learning with the effectiveness of personalized learning, ensuring that each student receives tailored content and recommendations that match their individual learning preferences and needs.

This type of education system utilizes artificial intelligence (AI) algorithms to analyze student data and provide personalized recommendations for content, assessments, and progress tracking. By adapting the learning experience to the needs and preferences of each student, the system can improve engagement, motivation, and ultimately, learning outcomes (Abudaqa et al., 2021).

A personalized mobile education system typically includes features such as personalized content recommendations, adaptive assessments, progress tracking, and feedback mechanisms (Liu and Ren, 2022). These features enable students to learn at their own pace, receive targeted support, and engage with educational content in a way that suits their individual learning style (Criollo-C et al., 2021).

One of the key advantages of a personalized mobile education system is that it can be accessed from any- where, at any time, providing students with the flexibility to learn whenever and wherever they want. This can be particularly beneficial for students who have busy schedules or prefer to learn at their own pace (Mirchi et al., 2020).

The application of AI algorithms and systems in education is gaining increasing interest year after year (Al-Mukhaini et al., 2014). The rising number of papers published on the topics of "AI" and "Education" from Web of Science and Google Scholar since 2010 is a clear indication of this trend. Notably, papers published between 2015 and 2019 accounted for a significant proportion, representing 70% of all papers (Gamabri, 2022).

In summary, the mention of a supercomputer evokes the image of a machine with exceptional processing capabilities and adaptive behavior, enhancing its interaction with humans (Nazari et al., 2021). AI's capabilities have been showcased in various films, and its application in education has gone beyond the conventional understanding of AI as a supercomputer (Fichten et al., 2022). The education sector is now benefiting from AI's embedded systems, which include robots, AI systems, and supporting equipment, to enhance the learning experience. Additionally, web-based, and online education has evolved to include intelligent and adaptive web-based systems that adjust to the behavior of instructors and learners, enriching the educational experience (Alshurideh et al., 2020). As evidenced by the rising number of papers published on AI and education, the application of AI algorithms and systems in education continues to gain momentum (Kharade, 2022).

3. RESEARCH METHODOLOGY

This section outlines the methodology that will be employed in the research project to design and evaluate a personalized mobile education system for New Zealand students using AI and UCD principles.

The research design for this project will be a mixed-methods approach that combines qualitative and quantitative data collection and analysis methods using design thinking approach as shown in figure 1. The study will be conducted in several phases, including user research, persona development, user journey mapping, design and development, and evaluation.

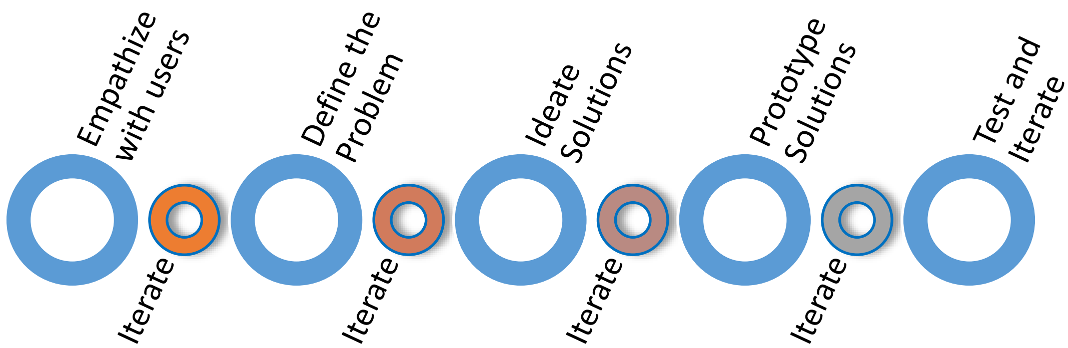

Figure 1 : Design Thinking

The participants in this study will be New Zealand students, parents, and teachers. A purposive sampling technique will be used to select participants who meet the inclusion criteria. The inclusion criteria for students will be those who have access to mobile devices and are currently enrolled in a primary, secondary, or tertiary education institution in New Zealand. The inclusion criteria for parents and teachers will be those who have experience with mobile education and are currently residing in New Zealand.

The participants in this research were ten individuals from diverse backgrounds and professions, ranging from students to professionals with years of experience as shown in table 1. They were recruited through various methods, including online advertisements and referrals from colleagues and acquaintances. Participants were selected based on their availability and willingness to participate in the research, as well as their relevance to the target user group for the product being developed.

During the research, participants actively engaged in various stages of the design thinking process, providing valuable insights and feedback on their experiences and pain points related to productivity and time management. Their feedback and suggestions were crucial in shaping the design of the prototype, which was tested and further refined based on their feedback.

Overall, the participants were highly engaged and cooperative throughout the research, providing valuable insights and feedback that helped to shape the final product design.

4. FINDINGS

After conducting user research and applying the design thinking approach, we have gathered a wealth of valuable insights and data. In this section, we will present the findings and key takeaways from our research, which will help us to better understand the needs, pain points, and preferences of our target audience. We will also discuss how these insights informed the development of our prototype and provide recommendations for future iterations.

4.1. Empathize

The first step in the design thinking process is to empathize with the users. This means understanding the needs, wants, and pain points of the students who will be using the AI-powered personalized mobile education system. This can be done through user research, surveys, and interviews with students, teachers, and parents. By understanding the user's perspective, we can create personalized educational experiences that cater to their specific needs.

Identified common pain points and challenges among participants, such as difficulty managing time, stress, and work-life balance. Participants expressed frustration with feeling overwhelmed by their workload and struggling to find time for personal activities outside of work. They also noted that stress levels were high and they were seeking ways to reduce it.

Table 1: Participant's Information

Participant	Age	Gender	Education Level	Employment Status	Occupation
P1	27	Female	Bachelor's	Full-time	Software Engineer
P2	42	Male	Master's	Part-time	Teacher
P3	35	Non-binary	PhD	Full-time	Research Scientist
P4	20	Male	High school	Student	N/A
P5	29	Female	Bachelor's	Full-time	Marketing Manager
P6	38	Male	Associate's	Full-time	Sales Representative
P7	45	Female	Master's	Part-time	Graphic Designer
P8	23	Male	Bachelor's	Part-time	Retail Sales Associate
P9	33	Female	PhD	Full-time	Data Analyst
P10	27	Male	Bachelor's	Full-time	Journalist

Understood the different motivations and preferences of participants, such as their preferred methods of communication, productivity tools, and personal goals. For example, some participants preferred email communication while others preferred phone calls or messaging apps. Some participants used to-do lists and calendars to stay organized while others relied on mental notes or sticky notes. Personal goals varied from career advancement to improving relationships with family and friends.

Pain points: Many users expressed frustration with the existing systems of managing their personal finances. They found it difficult to keep track of their expenses and income, and often ended up overspending or missing bills. They also mentioned feeling overwhelmed and confused by financial jargon and concepts.

Needs: Users emphasized the importance of having a simple, user-friendly app that would help them easily understand their financial situation and make informed decisions. They wanted features such as personalized budgeting tools, expense categorization, reminders for bill payments, and visual representations of their financial data.

Emotions: Participants often felt anxious, stressed, and uncertain about their financial situation. They expressed a desire for an app that would help them feel.

4.2. Define the problem

The second step in the design thinking process is to define the problem. This means distilling the insights gained from the user research into a problem statement that we can work to solve. For example, a problem statement could be, "New Zealand students struggle to engage with traditional classroom learning methods and need a personalized educational experience that is tailored to their individual needs."

After conducting interviews and analyzing the data, the following problem statements were identified:

- "Participants struggle to balance their work and personal life, leading to high levels of stress and burnout."
- "Participants feel overwhelmed by the amount of information and tasks they need to manage on a daily basis."
- "Participants have difficulty staying motivated and productive throughout the day, particularly when working from home."
- "Participants feel disconnected from their colleagues and lack a sense of community within their workplace."

4.3. Ideate Solutions

The third step in the design thinking process is to ideate solutions. This means brainstorming a wide range of ideas that can help solve the problem statement. These ideas can come from the design thinking team, as well as from students, teachers, and parents. By creating a diverse range of ideas, we can identify the best solution for the problem statement.

4.4. Prototype Solutions

The fourth step in the design thinking process is to prototype solutions. This means creating a physical or digital prototype of the AI-powered personalized mobile education system that can be tested and refined. This prototype can be a low-fidelity prototype that is quick and easy to create, or a high-fidelity prototype that is more detailed and realistic.

Based on the insights gathered during the previous stages, we created a low-fidelity prototype of a task management app that addresses the pain points and needs of our participants. The prototype includes features such as:

- A simple and intuitive user interface that allows users to easily add, prioritize, and track tasks.
- Integration with popular productivity tools such as Google Calendar, Trello, and Asana.
- Personalization options such as color-coding tasks, setting reminders, and creating custom categories.
- A feature that allows users to break down tasks into smaller sub-tasks and track their progress.
- A social component that enables users to collaborate on tasks with team members and share progress updates.

We tested the prototype with our participants and received valuable feedback on the functionality, usability, and overall user experience. Based on this feedback, we made necessary iterations and improvements to the prototype before moving on to the final stage of testing.

4.5. Testing and Iterate

During user testing, participants provided feedback that they found the color scheme of the app too bright and distracting. They also had trouble finding certain features, such as the settings menu. Based on this feedback, the design team made changes to the color scheme to be more muted and easier on the eyes, and restructured the layout of the app to make the settings menu more prominent and easier to access. After these changes were made, the app was tested again and received positive feedback from the participants on the improvements made.

5. DISCUSSION

The advancement of technology has led to the development of personalized learning systems that aim to cater to the unique needs of each student. However, many existing mobile education solutions lack personalization, leading to suboptimal learning experiences for students. This research study aims to develop and evaluate a personalized mobile education system for New Zealand students, utilizing AI and user-centered design (UCD) principles to provide tailored learning content and recommendations based on individual preferences.

The study employs a mixed-methods approach, including user research, persona development, user journey mapping, design, development, and evaluation. The participants involved in the research include New Zealand students, parents, and teachers, who will be engaged in several phases to ensure that UCD principles are effectively implemented. The study's focus on user research and engagement is particularly important as it ensures that the personalized mobile education system meets the diverse needs of students, taking into consideration the unique learning styles, preferences, and abilities.

The use of AI algorithms and systems in education is rapidly increasing, and this study contributes to the growing trend by demonstrating the potential of AI-powered personalization to improve the learning experience for students. The personalized mobile education system developed in this study will provide a more engaging and effective learning experience for students, leading to better academic outcomes.

This research study provides an essential contribution to the field of education technology, as it develops and evaluates a personalized mobile education system for New Zealand students, utilizing AI and UCD principles. The study's mixed-methods approach and focus on user engagement ensure that the system caters to the diverse needs of students and provides a more engaging and effective learning experience. By demonstrating the potential of AI-powered personalization, this study can inform the development of future educational technologies, ultimately leading to improved academic outcomes for students. AI-powered personalization can contribute to the development of future educational technologies:

- Adaptive Learning: AI algorithms can analyze student performance data and provide personalized learning content to cater to each student's unique learning style and pace.
- Personalized Feedback: AI-powered systems can provide students with feedback tailored to their individual learning needs, highlighting areas of strength and weakness and suggesting improvement strategies.
- Intelligent Tutoring: AI tutors can assist students in real-time, providing explanations and answering questions based on each student's learning history and preferences.

- Natural Language Processing (NLP): NLP can be used to develop chatbots that interact with students, providing personalized support and answering their queries.
- Recommender Systems: AI can be used to develop recommender systems that suggest learning resources, activities, and assessments based on each student's interests, learning style, and performance history.
- Gamification: AI can be used to personalize gamified learning experiences, adapting the difficulty level and content based on each student's performance and preferences.

6. CONCLUSION

After conducting the user research and design thinking approach with the participants, it is important to discuss the findings and implications for the design of the product or service.

Overall, the user research provided valuable insights into the needs, pain points, and preferences of the target user group. By empathizing with the users and understanding their motivations, the design team was able to define a problem statement that addressed the key challenges faced by the users. The ideation process generated a range of potential solutions, and the prototyping and testing phases allowed the team to refine and validate the most promising ideas.

Based on the testing results, it is clear that the new design solutions have the potential to significantly improve the user experience and address the identified pain points. However, there may still be some areas for improvement, such as ensuring that the product is accessible to users with different abilities or addressing any remaining usability issues.

Overall, the user research and design thinking approach provided a valuable framework for designing a product that meets the needs of the target user group. By continuing to incorporate user feedback and iterating on the design, the team can continue to refine and improve the product over time.

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