



APPLYING DESIGN THINKING IN EDUCATIONAL TECHNOLOGY DEVELOPMENT

G.Z.Toshmukhammedova

Samarkand State Institute of Foreign Languages

g.toshmukhammedova@gmail.com

Abstract

Design thinking has emerged as a powerful human-centered approach for problem-solving and innovation, particularly in educational technology development. This study explores the structured application of design thinking through its three main stages—immersion, idea generation, and prototyping—and expands on practical procedures such as idea collection, analysis, selection, and refinement. Using qualitative methods including brainstorming, participant observation, and interviews, the study identifies user needs and translates them into functional requirements for software development. The findings demonstrate that design thinking enhances the development of user-centered educational solutions by promoting creativity, collaboration, and iterative improvement. The study concludes that integrating design thinking into educational program development significantly improves the relevance and effectiveness of learning tools, especially in mobile learning environments.

Keywords: design thinking, educational technology, prototyping, user-centered design, mobile learning

Introduction

In recent years, design thinking has gained increasing attention as an innovative methodology for solving complex problems across various domains, including education and software development. Unlike traditional approaches that



focus primarily on predefined requirements, design thinking emphasizes understanding user needs and developing solutions through iterative processes.

Researchers have categorized the design thinking process into three key stages: immersion, idea generation, and prototyping. The immersion stage focuses on collecting and analyzing data to understand user contexts. The idea generation stage involves collaborative efforts to develop innovative solutions, while the prototyping stage translates abstract ideas into tangible forms for testing and validation.

Vertherlli further highlights the importance of design thinking in requirements development, arguing that it prioritizes customer needs over rigid specifications. This approach allows for rapid prototyping and continuous interaction with users, making it particularly suitable for educational technology and mobile learning environments.

This study aims to examine how design thinking processes can be systematically applied to identify user needs, generate ideas, and develop effective educational solutions.

Methods

This study adopts a qualitative research design based on design thinking principles. Data collection and analysis were conducted through several structured stages:

Idea Collection

The first stage involved brainstorming sessions with participants (students and learners in mobile learning contexts). This creative technique enabled the generation of diverse ideas reflecting user perspectives.

Idea Analysis

Collected data were analyzed using coding techniques. Words and phrases



- **Internal sources:** documents, videos, audio, and images created or imported into the system
- **External sources:** websites, books, presentations, and other non-importable materials
- **Memos:** reflective notes linked to data sources

Coding was applied using nodes, which represent themes or concepts. These nodes helped structure the data and identify recurring patterns that reflect users' primary needs.

Idea Organization and Identification

Ideas were organized using mind mapping techniques, distinguishing between less creative and highly innovative ideas. This process allowed researchers to visualize relationships among ideas and prioritize them effectively.

Idea Selection and Profile Creation

The most relevant ideas were selected based on frequency and user preference. User profiles (personas) were then developed to represent target users and their needs.

- **Participant observation:** Researchers observed users in real contexts to understand behaviors and interactions.
- **Interviews:** Semi-structured interviews were conducted to gather detailed insights into users' experiences and expectations.

Requirements Identification and Prototyping

Based on analyzed data, system requirements were defined. Prototypes were then developed to represent potential solutions.



Prototype Refinement

Prototypes were tested with users, and feedback was collected using constructive and destructive brainstorming techniques to improve the final design.

Results

The application of design thinking resulted in the identification of key user needs and the development of relevant educational solutions. The brainstorming and coding processes revealed that frequently mentioned ideas corresponded closely to users' actual requirements.

Mind mapping facilitated the differentiation between basic and innovative ideas, enabling researchers to prioritize the most impactful solutions. The creation of user profiles provided a deeper understanding of target audiences, improving the relevance of the developed prototypes.

Prototyping and iterative refinement significantly enhanced the usability and effectiveness of the solutions. User feedback highlighted the importance of continuous interaction and adaptation throughout the development process.

Overall, the results indicate that design thinking supports the creation of flexible, user-centered educational tools, particularly in mobile learning environments.

Discussion

The findings of this study align with previous research emphasizing the effectiveness of design thinking in innovation and problem-solving. By focusing on user needs rather than predefined requirements, design thinking enables more adaptive and relevant solutions.

Vertherlli's perspective on design thinking as a method for identifying customer needs is supported by the results, which demonstrate that user-centered approaches



lead to more effective outcomes. The use of qualitative methods such as interviews and observation further strengthens the validity of the findings.

Additionally, the iterative nature of prototyping allows for continuous improvement, reducing the risk of developing ineffective solutions. However, the process requires time, collaboration, and active user participation, which may present challenges in some contexts.

Despite these limitations, the study confirms that design thinking is a valuable approach for developing educational technologies that meet the evolving needs of learners.

Conclusion

This study demonstrates that design thinking provides a structured yet flexible framework for developing user-centered educational solutions. Through stages such as immersion, idea generation, and prototyping, it enables the identification of user needs, the creation of innovative ideas, and the development of effective solutions. The integration of brainstorming, coding, and prototyping techniques enhances both creativity and analytical thinking, resulting in more relevant and practical outcomes. Therefore, design thinking is highly recommended for educational technology development, particularly in mobile learning contexts.

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