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Enhancing Design Thinking with AI-Augmented Brainwriting

Introduction

In today's rapidly evolving business landscape, the necessity for innovative solutions is more critical than ever (Tschimmel, 2012). Companies are increasingly adopting design thinking methodologies to drive creativity and develop groundbreaking ideas (Tschimmel, 2012). This paper, created in collaboration with Raiffeisenlandesbank Oberösterreich (RLB OÖ), delves into enhancing the ideation phase of design thinking using Large Language Models (LLMs) and brainwriting.

Fundamentals of Design Thinking

Design thinking is an iterative process that prioritizes human-centered solutions, encompassing phases such as 'Understand,' 'Observe,' 'Point of View,' 'Ideate,' 'Prototype,' and 'Test' (Tschimmel, 2012). The ideation phase, which focuses on generating creative solutions, traditionally employs brainstorming ((Tschimmel, 2012). However, psychological barriers like evaluation apprehension and groupthink often limit its effectiveness (Al-Samarraie & Hurmuzan, 2018). Brainwriting, an alternative method, minimizes these barriers by allowing individuals to generate ideas independently before sharing them with the group (Shaer et al., 2024).

Aim and Methodological Approach

This paper aims to explore the integration of advanced technologies like LLMs and tech-based visualizations to enhance the ideation phase of design thinking. The research focuses on two key questions:

- What changes in the design thinking process result from the use of LLM-supported brainwriting?
- Do Tech-Based Visualizations enhance understanding and engagement during the ideation phase?

A comprehensive literature review, supported by team discussions, serves as the foundation for this exploration, providing insights into the potential benefits and challenges of incorporating these technologies.

Enhancing the Ideation Phase with AI

Brainwriting vs. Brainstorming

Brainwriting overcomes many limitations of brainstorming by reducing the influence of dominant personalities and promoting a more inclusive environment (Paulus & Nijstad, 2003). This method ensures a diverse array of ideas, which is further enhanced by LLMs' ability to generate, refine, and evaluate ideas (Shaer et al., 2024).

Integration of Large Language Models

LLMs like GPT-4 can significantly enhance brainwriting by providing real-time suggestions and feedback (Shaer et al., 2024). These models can introduce novel perspectives, refine ideas through iterative processes, and ensure the quality of generated ideas by leveraging vast amounts of data (Shaer et al., 2024). The integration of visual aids, such as projectors and tracking mats, further supports this process by making the ideation more interactive and engaging (Wilson, 2013).

Practical Implementation

To demonstrate the feasibility of AI-augmented brainwriting, a prototype web application, "Let the LLM Think," was developed. This application facilitates real-time collaborative brainstorming sessions, integrating features like idea import from Excel, session data export to PDF, and AI-assisted idea generation. By leveraging technologies such as React and Firebase, the application ensures a seamless user experience and robust performance.

Analysis of Technological, Spatial, and Organizational Dimensions

Technological Feasibility

Implementing LLMs and visual-enhanced models requires robust technological infrastructure. Tools like GPT-4 can handle multimodal inputs, providing comprehensive assistance during the ideation process (Reza et al., 2023). Tracking mats and projectors enable real-time visualization and interaction, enhancing the collaborative experience (Wilson, 2013).

Spatial Requirements

An effective ideation setup involves a central table with a tracking mat and a ceiling-mounted projector to display ideas (Wilson, 2013). This setup ensures that all participants can engage interactively, fostering a dynamic environment conducive to creativity (Shu et al., 2023).

Organizational Impact

Integrating LLMs into the design thinking workflow can streamline ideation and prototyping processes (Shaer et al., 2024). These technologies can assist in generating and evaluating ideas, making the entire process more efficient and effective (Bilgram & Laarmann, 2023).

Conclusion

AI-supported design thinking holds significant potential to enhance the ideation phase by overcoming traditional brainstorming limitations. The integration of LLMs and tech-based visualizations can lead to more diverse, high-quality ideas and streamlined workflows. While further empirical research is necessary to explore long-term benefits and challenges, the findings suggest that organizations can achieve more innovative and impactful solutions by adopting these technologies.

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