

Enhancing Educational Comic Book Innovation Through Design Thinking: a Case Study of Lab Buddy

Ainaya Chairunnisa^{1*}, Yulianto Suharto²

School of Business and Management, Institut Teknologi Bandung¹

*Email: ainaya_chairunnisa@sbm-itb.ac.id

Abstract

Indonesia's significant demographic dividend presents a valuable opportunity that should be leveraged to achieve the vision of Indonesia Emas 2045, with a key focus on enhancing educational quality. Despite government efforts to increase the number of schools, the quality of education in Indonesia still lags behind international standards. To address this issue, the Indonesian government needs to develop a learning environment that caters to students' diverse needs and learning styles, particularly in Mathematics. Technological advancements have introduced innovative educational tools, including math educational comics. This research uses the design thinking approach to develop an innovative math educational comic that aligns with students' and parents' needs and preferences. Data was collected through semi-structured interviews with the target customers of this product—the analysis of this data involved open coding, pattern coding, and triangulation to ensure validity. The findings indicate that while the product aligns with the respondents' needs and preferences, there is room for improvement in the comic's sentence structure. Feedback from participants should be carefully considered before finalizing the product, underscoring the importance of design thinking in effectively addressing the needs and preferences of the target audience.

Keywords: Quality of Education; Innovative Educational Tools; Math Educational Comic; Product Innovation; Design Thinking

A. INTRODUCTION

Education plays a crucial role in shaping human life. It encompasses acquiring and forming knowledge, skills, values, beliefs, and habits that enable individuals to function effectively and contribute to their communities (Verma, Doharey, & Verma, 2023). Achieving the development of well-rounded individuals requires quality education. This concept of quality education is dynamic and continually evolving, influenced by social, economic, and environmental changes (UNESCO, 2017). The United Nations recognizes the right to quality education and includes "Quality Education" as a goal in the Sustainable Development Goals established in 2012 (Leverage Edu, 2023).

In Indonesia, achieving quality education necessitates creating a learning environment that meets students' diverse needs, levels of understanding, and learning methods. Utilizing innovative educational tools can aid in introducing material effectively, especially for children, who often prefer play over learning and have shorter attention spans. For instance, children aged 11-12 typically have an attention span of only 25-35 minutes (CNLD Testing and Therapy, n.d.). Each child also has different levels of understanding and learning styles, presenting a significant challenge for educators to convey subject matter effectively.

Technological advancements have led to the development of various innovative educational tools, including educational comic books. These comics can be strategic tools that cater to various learning styles, enhance student engagement, and simplify complex concepts (Tatalovic, 2009). Mathematics, a subject that encourages critical thinking and problem-solving, can benefit from this approach. Many children find math challenging and uninteresting, but educational comic books could transform their perspective.

Addressing the quality of education issues in Indonesia, Lab Buddy offers educational products designed to support students' understanding of school subjects through engaging learning methods. Lab Buddy aims to enhance education for Indonesia's younger generation by focusing on fundamental concepts and improving students' learning experiences with content that aligns with Indonesia's curriculum and technological advancements. Currently, Lab Buddy is developing Mathventure, an educational comic book for math, in response to the low math proficiency among Indonesian students compared to their international peers.

* Corresponding author

To create high-quality educational products like Mathventure, Lab Buddy employs a design thinking methodology. Design thinking is a human-centered approach that involves understanding and observing user needs to create innovative solutions (Brown, 2008). This methodology includes stages such as empathizing, defining, ideating, prototyping, and testing, which are iterative and non-linear. By applying design thinking, Lab Buddy can better understand the preferences of students (end users) and parents (buyers or decision-makers), which will enhance the quality and innovation of their products, particularly Mathventure.

B. RESEARCH METHOD

The research commenced by identifying a problem within Lab Buddy, which served as the basis for pinpointing the specific area requiring attention, focusing on the product innovation of Mathventure. Once the problems were identified, research questions and objectives were formulated to maintain focus and ensure the research remained relevant. The next step involved conducting a business analysis of Lab Buddy to assess its current condition and identify potential areas for improvement. This was followed by establishing a theoretical foundation to gain insights into relevant theories and variables for the study. The research methodology section details all research processes and stages, including data collection using a qualitative approach, specifically through interviews. The collected data will be analyzed using coding techniques to organize and interpret the qualitative information. The final stage of the research will involve drawing conclusions and outlining business implications that will benefit Lab Buddy in the future.

This research utilizes primary data collected from semi-structured interviews. Design Thinking serves as the framework, focusing on the Empathy and Testing stages for the Mathventure educational comic book product from Lab Buddy. The interview process initially concentrates on the Empathy stage to understand the needs and preferences of the customer persona regarding children's educational books. Subsequently, the process moves to the Testing stage, where customer personas interact with the Mathventure product prototype. During this stage, responses and comments regarding the prototype are gathered to identify shortcomings and obtain suggestions for improving the Mathventure product.

The data obtained from the semi-structured interviews are processed and analyzed to develop solutions aligned with the conceptual framework. These solutions form the basis of recommendations for Lab Buddy, which are presented through a business implementation plan. Coding techniques summarize and categorize the information into characteristic patterns without losing critical details to process and analyze the qualitative data. Both first-cycle and second-cycle coding methods are used. In the first cycle, Initial/Open Coding breaks down the data into parts for examination and comparison to identify similarities and differences. This approach is suitable for exploring less structured, flexible data. In the second cycle, Pattern Coding distills the extensive data into more focused themes by identifying and summarizing patterns. To validate the data, triangulation through expert review is employed to enhance the validity and reliability of the study.

C. RESULTS AND DISCUSSION

After gathering data and engaging in discussions with ten parents and their children through semi-structured interviews, the researcher summarized the findings from the Empathize and Testing stages for developing Mathventure product innovation. From the parents' perspective, most reported that their children are moderately interested in mathematics. They noted that their children enjoy learning math, particularly because they have been interested in numbers and counting from a young age. However, these children still struggle with focusing and understanding new material, especially story problems. They often need additional time and assistance to analyze and solve these problems. To support their children's learning at home, most parents enroll them in math tutoring courses, both public and private, which offer various methodologies such as conceptual learning and fast calculation methods. Some parents also provide practice questions independently through daily communication or written exercises.

Regarding educational products, most respondents reported enrolling their children in math tutoring courses tailored to their children's learning styles. Parents also purchase various books, including educational books, storybooks, and comics, to foster early literacy, given the low literacy levels in Indonesian society. On comic perception, parents indicated that their children enjoy storybooks and comics with educational elements. Although some children only read books once due to other interests, those who engage with illustrated and colorful books find them more appealing. When informed about educational math comic products, most parents expressed interest in purchasing them, especially since they have not encountered such products in bookstores or

fairs. They believe that a product with exercise or activity features would benefit children who prefer interactive learning.

Regarding educational products, some parents frequently buy books and educational tools, while others rely solely on school textbooks. Some parents also purchase educational cards like flashcards for young children. A few parents buy specialized educational tools based on their child's level of understanding. Before purchasing, parents typically review the product's content and consider recommendations and reviews from family, friends, and online sources. After presenting the Mathventure prototype to parents, most found the comic's colors, illustrations, characters, and layout appealing. They appreciated the structured format, which includes a story, math problems, a material discussion section, and practice questions. The interactive activity feature was also well-received, as it engages children in learning math. However, feedback indicated that the comic's text is too lengthy and complex, confusing for children, particularly early readers. Parents suggested simplifying and enlarging the font to enhance readability.

From the children's perspective, most enjoyed the Mathventure prototype, finding the illustrations, colors, characters, and story engaging. They were excited about the interactive activities, such as stickers, drawing, coloring, and puzzles. Following these interviews, the researcher conducted a validation interview with a mathematics educator to validate the feedback on the Mathventure prototype. The expert confirmed that the comic's design is attractive and the material is well-presented but agreed that the lengthy text is unsuitable for first-grade students who may struggle with long sentences. This validation supports the validity of the feedback obtained from parents and children.

D. CONCLUSION

This research aimed to enhance the innovation of Lab Buddy's math education comic product, Mathventure, using the concept of design thinking. By exploring design thinking, Lab Buddy gained insights into the needs and preferences of its target market—children in grades 1-3 as end users and their parents as buyers or decision-makers. The design thinking approach, particularly during the empathizing and testing stages, allowed Lab Buddy to deeply understand customer desires and refine the Mathventure product prototype before its broader market launch.

Lab Buddy identified factors influencing customer decisions on educational products through the empathize stage, such as content, price, and quality. Understanding these factors enabled Lab Buddy to develop a targeted strategy, improving the likelihood of product success and customer retention once the product is launched. The research provided valuable insights and recommendations for the development of Mathventure. The feedback obtained from interviews can be applied to enhance the quality and innovation of the product. This demonstrates that design thinking effectively addressed Lab Buddy's needs to improve the product development process.

Moving forward, Lab Buddy will integrate these insights into the Mathventure product. Lab Buddy must evaluate the analysis results and obtain approval from all team members before applying the changes. They should assess the relevance of the feedback, as some inputs may reflect the preferences of only a few respondents. Once the prototype reaches an optimal stage, Lab Buddy can plan production, go-to-market (GTM) strategy, product launch, and sales.

Future research holds significant potential for further development. Researchers can explore design thinking in greater depth to enhance product innovation for math education comics. The results of this research should be rigorously evaluated to ensure their applicability to Lab Buddy's future products, including Mathventure. Applying the research findings through design thinking will be essential before embarking on subsequent product innovation efforts.

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