

HUMAN-CENTERED DESIGN IN PROMOTING LANGKAWI'S CULTURAL HERITAGE: MAHSURI DOLL HOUSE INNOVATION

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Abstract

This paper explores the development of the Mahsuri Doll House, a miniature replica inspired by the legendary Rumah Mahsuri, using a Human-Centered Design (HCD) approach. By integrating myths and legends into product design, the project aims to preserve and promote Langkawi's cultural legacy through an educational medium. The innovation process involved deep user engagement to ensure the product resonates with diverse audiences, including students, educators, and tourists. Through this approach, the Mahsuri Doll House serves as a creative tool to make Langkawi's folklore accessible, engaging, and educational, while fostering cultural appreciation. The paper not only highlights the successful application of the HCD approach but also underscores the potential of merging traditional narratives with modern design techniques. This potential offers a hopeful and inspiring outlook for the future of cultural preservation and product design.

Key words: Human-Centered Design, Cultural Heritage Product, product innovation

INTRODUCTION

The legends and folklore of culture play an essential role in preserving its identity, offering new windows into its history, beliefs, values and human experiences. (See, 2024; Anuar, et al., 2021)

Langkawi is one of the Malaysian Islands that are rich in myths and legends. It has 99 islands, each of which has its own stories. The legend of Mahsuri, a woman who has been wrongly



Figure 1 (a) Overview map of Langkawi consist of 99 Island and (b) The illustration of Mahsuri.

Source : Tourism Malaysia, Ministry of Tourism.

accused of adultery and cursed for seven generations, has been passed down through generations and is deeply embedded in the identity of Langkawi (figure 1). The legends of Mahsuri stand as a cornerstone of the island's cultural heritage and are the famous icon and symbol of the island. (Anuar, et al., 2021; Razak, & Ibrahim, 2017) However, as modernisation accelerates and traditional forms of storytelling evolve, there is a growing need for innovative ways to preserve and communicate these cultural narratives to younger generations and global audiences. (Saxby, 2018; Anuar, et al., 2021) The Mahsuri Doll House, a miniature replica of Rumah Mahsuri, represents this study to merge modern product design with the rich cultural legacy of Langkawi to offer an interactive and educational experience. This study project will draw on the principles of Human-Centered Design (HCD) to ensure the product outcome is not only engaging and accessible to a wide audience but also culturally meaningful to the people. By focusing on user needs, particularly in educational contexts, the Mahsuri Doll House aims to bridge the gap between traditional storytelling and contemporary learning tools, fostering a deeper understanding

of Langkawi history. This paper outlines the development process of Mahsuri Doll House through the lens of HCD, highlighting how cultural heritage can be preserved and promoted through design that enhances people's experiences and create a new meaning for people. This study will explore how myths and legends can inspire innovative products for educational and cultural purposes. Through this case study, this study demonstrates how HCD approaches can contribute to sustaining cultural legacy in this rapidly changing world in which our young generation is more focused on digital things. (Silva, 2020)

This study explores how HCD design principles can be applied to developing culturally inspired educational products, using the Mahsuri Doll House as a case study. The project seeks to demonstrate how traditional narratives, such as measuring Legends, can be preserved and made accessible through user-focused and innovative design. The objectives of this study are:

1. to develop a promotional and educational product that transforms Langkawi's folklore into interactive learning tools that foster a more profound understanding and appreciation of local heritage.
2. to explore HCD principles in developing myths and legend as inspiration for product innovation and engagement.

HUMAN-CENTRED DESIGN METHOD

The HCD approaches include techniques and methods designers use to develop and create products, systems, or services with a deep understanding of human needs, wants and behaviour. According to Isa & Liem, (2015); Ali et al., (2023) and Marchese, (2021) the core principle of HCD is to place users and stakeholders as a primary focus in the design development process to ensure that the outcome of the product will fulfil user needs and effectively solve design problems. (Boy, 2017; Burns, 2018; Isa, & Liem, 2023) In this study, HCD will be explored on how this approach can be incorporated with culture into design development in developing a product that is inspired from myth and legends. The combination of creativity, culture and HCD

approach will enhance designers' discoveries in understanding human needs that can drive positive change in innovations and inspire new perspectives in designing new product development. (Isa & Liem, 2015; Ali et al., 2023)

RESEARCH METHODS

This study employs a qualitative HCD approach (Lopez, & Bhutto, 2023; Isa & Liem, 2015; Ali et al., 2023; Silva, 2020), focusing on the development and evaluation of Mahsuri Doll House as an interactive educational tool. Researchers from Universiti Teknologi MARA, Universiti Putra Malaysia, and Multimedia University conducted this study in collaboration with the Langkawi Development Authority (LADA). This study was structured in three phases: (i) Phase 1: User research; (ii) Phase 2: Design Development; (iii) Phase 3: Product evaluation (see figure 2) that aligned with HCD principles to ensure that the product will address the issues and challenges, preferences, needs and experiences of the intended users. (Silva, 2020)

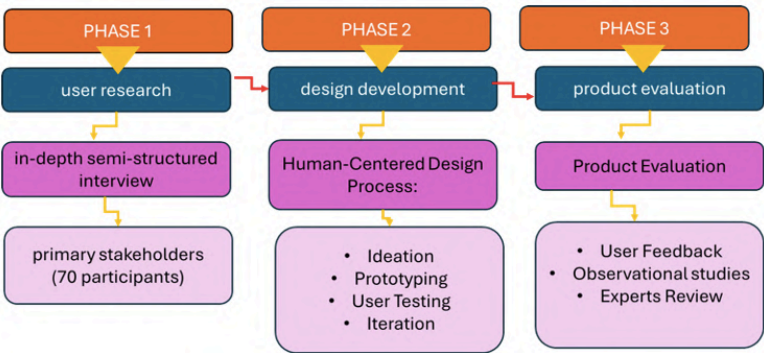


Figure 2. Three key phases of research development.

Phase 1: Study on User Research

This phase allows the researcher to gather insights into the target audience's needs, cultural understanding, and expectations of an educational product based on the folktale of Mahsuri legend in Langkawi. This study involved a total of 95 participants, including local and international tourists, students,

and local residents who were randomly selected at the tourist spot area. Meanwhile, the cultural, tourism and designer experts were selected based on suggestions from the main collaborator, LADA. An overview of the respondents' background is illustrated in Table 1. In order to ensure the systematic and clarity of data organisation, initial codes for all participants were created and recorded in Table 1. All participants were primary stakeholders of this study to gain an overview of their diverse perspectives on educational and cultural experiences. This study conducted in-depth interviews methods adapted from Schober (2018); Isa, & Liem, (2021) and Baxter, & Jack, (2008), to understand the following context:

Table 1. Overviews of Respondents' Background

Respondent s	Participants Coding	Age	Male / Female	Type of employment	Education
International Tourist (IT) (20 pax)	IT1 – IT15	22 - 65	8 males 12 females	Engineers, Teachers, Accountants, Content Creators, Consultant, Business, Professor	Degree, Master, PhD
Local Tourist (LT) (20 pax)	LT1- LT15	18 – 54	10 females 10 males	Executive, Teachers, Lecturers, Business, Bank Officer, Manager, Software Developer	Diploma, <u>Degree</u> , Master, PhD
Local Residents (LR) (20pax)	LR1- LR20	19- 67	11 males 9 females	Students, Business, Operator, Executive, Chef, Doctor, Nurse	Diploma, Degree, Master
Experts:					
LADA Authorities (LA) (6pax)	LA1-LA5	32 – 55	3 males 2 females	LADA Director Executive Officers Senior Rangers	Degree, Master, PhD
Tourism Authorities (TA) (2pax)	TA1 – TA2	44- 45	2 females	Deputy Director Executive Officers	Master, PhD
Cultural Authorities (CA) (2pax)	CA1 – CA2	44- 45	2 females	Director Executive Officers	Master, PhD
Designers (D) (15pax)	D1 – D15	25 – 31	7 males 8 females	Product Designers UX / UI Designers Interior Designers	Diploma, Degree, Master
Educators (E) (10pax)	E1 – E10	28 – 55	8 females 2 males	Lecturers, Teachers, Trainers	Degree, master, PhD

Phase 2: Initial Ideas and Design Development Process




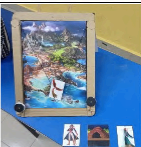

Phase 2 was the process of this study's translation of user insights into product design that will effectively communicate

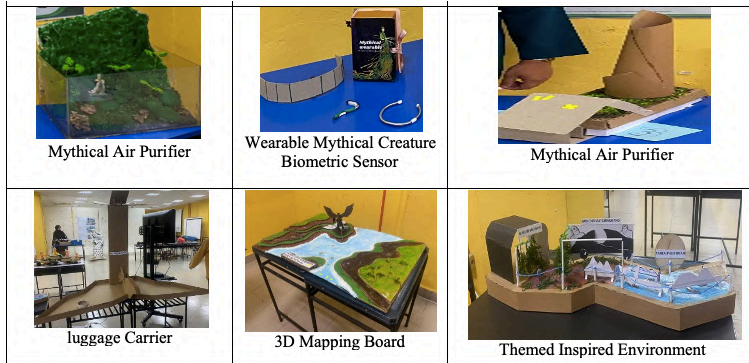
the Mahsuri legend into a new form of cultural engagement that also serves as an educational product for people to learn about Mahsuri and Malaysian Culture. HCD methods for idea development were used during this phase are:

1. Ideation

Based on the user research data, 15 initial ideas for the combination of Myth, Legends, and Mahsuri product proposals were brainstormed and critiqued (refer Table 2). After the critique process, the most promising ideas were shortlisted, and further refinement focused on combining the best elements from the multiple concepts. The product proposal selection was based on the cultural impact, novelty of the ideas, educational engagement, and aesthetic factors.

Table 2. 15 different initial ideas combining elements of Langkawi myths and Legends and the story of Mahsuri.

Initial Ideas with low-fidelity prototypes		
 Diorama Mahsuri House	 Mahsuri Monument	 Queen Of Langkasuka Doll
 Langkawi Legends Quest: An Interactive Mythical Board Game	 A Langkawi Mythical Quest Board Experience	 Mystical Realms: Portals of Langkawi Chronicles
 Design Myth Bag Packaging	 Mythical Gamify Cation Elements	 Mythical storytelling gift box



2. Prototyping

After the brainstorming and critiques session, several promising concepts were selected for further development. During this stage, low-fidelity prototypes were made to explore the design's practicality and also to test the engagement with the user, design elements, size and scale, interactive features, and visual representation (refer to Figure 3).



Figure 3. Multiple selected ideas for further development to test with the user.

3. User testing

The prototypes were tested with the sample of the target audiences to gather feedback on usability, engagement and educational value. Participants were asked to interact with the prototypes, explore their features, and they will share the

the prototypes, explore their features, and they will share their thoughts on design and overall user experience.

4. Iteration

Based on the feedback, the researcher modified the ideas to improve the concept ideas' functionality, cultural representation and user experience. The iterative nature of the prototyping phase allowed the team to continuously test and improve the product , ensuring the final design aligned with the project goals.

Phase 3: Product Evaluation and Refinement

After completing the design development process, this study focused on one final concept and developed it into one final prototype to assess the effectiveness of the final product in meeting the project's aims and objectives in education, cultural preservation, and user engagement. The final version of Mahsuri Doll House was used for observational studies conducted with multiple stakeholders in an educational setting to evaluate how the product is used in practice and its impact on interactive learning. The collaborative interview was held during the session with experts to ensure the accuracy and authority of the cultural element represented in the final design and how well the product conveys the Mahsuri legend, which will engage people in learning about Langakwi's cultural heritage.

Data analysis

The qualitative data from the interview and observation were analysed using thematic analysis, and methods of analysis were adapted from Schober (2018); Isa, & Liem, (2021) and Baxter, & Jack, (2008), to identify themes and user preferences. The results from the data are used to develop a product that meets the study objectives, which is to develop a promotional and educational product that transforms Langkawī's folklore into interactive learning tools that foster a more profound understanding and appreciation of local heritage.

RESULT

The results of this study demonstrate the positive application of HCD in developing an educational product inspired by myth and legend that promotes and preserves cultural heritages through the development of the Mahsuri Doll House project. Through each step of the HCD approach, this study will reveal several key findings:

User Research Findings

From the extensive data gathered during the phase 1 in-depth interviews with 95 users, this study finalised three main themes that emerged throughout the interview response.

Theme 1: Cultural Engagement

Most of the respondents, both local and international audiences, had limited knowledge of the Mahsuri legends; they were intensely interested in Langkawi's cultural stories. Most participants expressed enthusiasm for a product that could provide engaging ways to learn about the island's history, especially myths and legends.

Theme 2: Educational preferences

Most respondents emphasised the need for interactive learning tools that stimulate curiosity and provide hands-on experiences. They preferred visual and tactile elements, indicating that a physical model like the Mahsuri Doll House would be more effective than digital material.

Theme 3: Tourist Interest

The data suggest that tourists visiting Langkawi were interested in exploring local culture and history, particularly through immersive experiences. Most of the respondents say interactive products could enrich their travel experiences and deepen their understanding of the island's heritage. Table 3 provides a comprehensive summary, overview of user research findings from the user interviews. It provides a clear structure for easy references and understanding of the insights gathered from the research process. The table includes the final key

themes and notable quotes from selected respondents providing a valuable feedback to serve a fundamental meaning and decision making in the design development of the product.

Table 3. Overview of user research findings from the user interviews.

Category	Percentages	Findings	Sample Quotes
Awareness of Langkawi legends	International Tourist 10% have basic knowledge	Limited knowledge of <u>Mahsuri</u> Legend, some were familiar with the name but not	Respondents IT4----- "...never heard of the legend. I came here for the scenery, and then I will depart from here to
	Local Tourist 35% had heard about <u>Mahsuri</u> Local Residents & Experts 100% fully aware	the whole story	Phuket..." Respondents IT19----- "...I love culture and heritage, but I do not know about <u>Mahsuri</u> , I heard some name of it, but never knew if. The promotion that we have on Geopark UNESCO..." Respondents LT3----- "...familiar with name only, <u>Mahsuri</u> ... but only on the surface story, no idea of what is all about..."
Interest in myth and legends	International Tourist 90% have a strong interest. Local Tourist 75% have strong interest Local Residents & Experts 100% interest	Most of the respondents have a high interest in Langkawi folklore and cultural <u>heritage</u> ; they also stated that they would look forward to learning about these stories in engaging methods.	Respondents IT7----- - "...I would love to know more about <u>Mahsuri</u> story, I will google it after the interview, any place that promotes <u>Mahsuri</u> in <u>Langkawi</u> ? I would really love to go..." Respondents IT15----- "...last time I <u>remember</u> , there was a place called Tomb of <u>Mahsuri</u> , but I have never been there because I heard from the locals there is nothing there...It's good if they promote this legend more ..."
			Respondents LT11----- "...it is a bit sad because now the place to promote <u>Mahsuri</u> is totally out of order...it is so sad that younger generations are even not aware of these legends..."

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Preferred Methods of Learning	<p>Visual tools preferences 85%</p> <p>Interactive tools preferences 88%</p> <p>Traditional tools 20%</p>	<p>Most of the participants preferred interactive and visual tools, such as physical, tangible models, videos, and hands-on exhibitions, to traditional learning methods, such as lecture-based or traditional text learning methods.</p>	<p>Respondents D3----- “...somethings that we can learn by touching and experimenting, it will be a good combination of technology and traditional things, such an interesting cultural product that teaches everyone with something unique...”</p> <p>Respondents TA1----- “...we need something that can promote our culture to younger generations, nowadays younger generation does not bother about heritage folklore stories, how to attract them, how to make them interested? ...”</p> <p>Respondents E5----- “...visual that is engaging would be</p>
			<p>interesting, and don't forget we still need the brochure, and book to promote even it is old school but still it is still relevant method...”</p>
Educational Product appeal	<p>Positive feedback: 90% give positive feedback on the concept proposal</p>	<p>The proposed concept of <u>Mahsuri</u> Doll House as an education tool for preserving cultural heritage received a <u>positive feedback</u></p>	<p>Respondent E7----- “...I like all the proposal that have interaction that user can touch, feel and can create a storytelling while exploring the product...”</p> <p>Respondent LT----- “...it is something people can explore together and can be used by 4-6 people; it is good and will enhance kids' imagination...”</p> <p>Respondent IT2----- “...it is something that we can play with our kids, and can learn the culture element...it is good...”</p>
Cultural Significant	<p>90% of the respondents agreed that cultural preservation is important.</p>	<p>Participants <u>emphasised</u> that preserving the <u>Mahsuri</u> legend is important for maintaining Langkawi's cultural identity, particularly in educational contexts.</p>	<p>Respondent IT17----- “...I'm from Norway, we have rich stories of our own myth and legends and we also believe Malaysian should promote the legends in multiple way...<u>Mahsuri</u> is an icon of Langkawi so need to make sure every generation remember <u>Mahsuri</u> as a legends queen in Malaysia...”</p> <p>Respondent LR3----- “...last time 20 years ago <u>Mahsuri</u> is so popular, but now the promotion of <u>Mahsuri</u> just <u>vanish</u>, and younger generation not really know who is <u>Mahsuri</u>, this legend need to be sustain and should include in educational system...”</p>

Design Development Outcomes

The data collected during phase 2 of the design development process led to the identification of three main themes for this study:

Theme 1: Prototyping User testing

During this session, participants responded positively to the Mahsuri Doll House design concepts; the participants highlighted the improvement in the scale layout to enhance interaction.

Theme 2: Interactive Features

Based on the user's suggestion, more interactive elements, such as movable components (e.g., doors and windows) and informational pop-ups, were incorporated into the final design (see Figure 4a and 4b). This allowed for both playful engagement and educational value, meeting the needs of both young and adult users.



Figure 4a. Suggestion for interactive features for the final concept.



Figure 4b. Suggestion for interactive features for the final concept.

Theme 3: Cultural Authenticity

The experts' review validated that the final product captured the key elements of the Mahsuri legend and the architectural features of Rumah Mahsuri. This validates that the product can serve as a culturally authentic educational tool (see Figure 5)



Figure 5: Expert review of the 3 proposals proposed for the final concept.

Product Evaluation Results

The data gathered during phase 3 for the product evaluation result has finalised three main themes. Each of these themes will be further describes to gain deeper insights into the overall evaluation result:

Theme 1: Educational Impact

Observational studies in the educational environment showed that the final concept of Mahsuri Doll House effectively engaged participants in learning about Langkawi's cultural history. Most of the participants reported that the product sparked interest in Mahsuri legends and Malaysian unique culture, providing a tangible connection to actual Malaysian traditional houses in real-life situations. Educators' feedback that the product increased student engagement and the students stated that they felt more connected with the content. The Educator code E5 stated that;

"...the design of rumah Mahsuri made my student actively participate in the storytelling session...when we presented the legends, they asked a lot of questions and discussed with each other, I can see how they show their curiosity about Langkawi's Cultural history and they wanted to visit Rumah Mahsuri in Langkawi for the onsite experiences..."

Theme 2: User engagements

During a collaborative discussion with the stakeholders, they revealed that Mahsuri Doll House is visually appealing and informative. The interactive design elements were particularly well-received as they encouraged deeper arguments with the cultural contents. The experts code LA1 mentioned;

"...most of us are quite satisfied with the final product outcomes. It is visually appealing even though it is only a prototype that is still under refinement, but we feel that this product can be developed further for refinements before it goes to the final production..."

From the statement above, it can be concluded that this Mahsuri Doll House gathered positive feedback on user engagement. They found the product visually appealing and informative, which enhanced engagement and learning.

Theme 3: Cultural Preservation

Feedback from the cultural experts confirmed that the Mahsuri Doll House succeeded in promoting Langkawi's heritage while presenting it in a way that resonates with modern audiences. The product was seen as a valuable tool for preserving the Mahsuri legend and ensuring its continuity among future generations (see Figure 5). The experts TA1 confirmed that the Mahsuri Doll House represented the cultural architectural aspect of Rumah Mahsuri and the legend, he stated;

"...I had high satisfaction with the overall design; the design focuses on attention to detail and educational value. It is still missing some accuracy, which makes it impossible to make it exactly like the actual house due to time and financial constraints; this effort is highly satisfactory..."

Some of the experts gave some recommendations for improvements, D3 recommended that;

"...it should combine with more interactive features; it will be good if each of the features includes some audio explaining the function and what the features are used for during the times..."

Meanwhile, the other experts also gave their recommendations, D7 & LA2 suggested;

"... combination digital interaction inside this Mahsuri Doll House will be interesting, add on some LCD screen for some engagement with the users , maybe some digital screen to show the introduction of Mahsuri legends.."

"...I think the product will create more meaning if some features such as audio narration or even more advanced with augmented reality of Mahsuri figures moving inside the house to do the house chores?...it is really like a real story for the user to explore the movement and it can further enhance the experience..."



Figure 5. The final concept of the Mahsuri Doll House.

DISCUSSION

Most of the experts expressed high satisfaction with the final product and acknowledged the concepts' educational engagement and aesthetic appeal. Many mentioned the unique way it blended storytelling with modern design principles, making the product's cultural narrative context accessible to different demographics. However, while the feedback was positive, some experts suggested there is a need to add more attention to details in more layers of interactivity, such as audio narration or augmented reality features, to enhance the educational experiences further. When compared with another cultural preservation initiative in the market, the Mahsuri Doll

House stood out for its combination of educational focus, interactive and engagement elements with people and aesthetic appeal representing the actual traditional Malay house. This product offered a different approach to cultural and education engagement by making Langkawi's folklore tangible and relatable, which includes features not commonly found in other preservation efforts that often rely on static display or written narrative.

CONCLUSION

The Mahsuri Doll House represents how traditional myths and legends can be translated into modern unique educational products using an HCD approach. The product effectively engages diverse audiences, enhances cultural understanding, and contributes to the preservation of Langkawi's heritage, making it a valuable asset in both educational and tourism contexts. The HCD approach proved effective in aligning the product with the needs and preferences of its target users. The initiative proof of prototyping and user feedback allowed for the continuous refinement of the product, ensuring it was both user-friendly and culturally authentic.

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