Extended Abstract
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Design Strategies to Strengthen Epistemic Value in Consumer Electronics and Prolong Product Lifetime

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Introduction

The consumer electronics waste has become a serious environmental concern (World Health Organization, 2024). A significant factor driving this issue is "premature obsolescence," which refers to the premature discontinuation of a product use or the premature replacement of a functioning product with a new one (Magnier & Mugge, 2022; Ylä-Mella et al., 2022). Current consumer replacement theory attributes this phenomenon to psychological value trade-offs, where consumers prematurely value new products over their current ones (Van den Berge et al., 2021). This shift is often driven by an attraction to novel features, updated designs, and the overall sense of novelty offered by new products on the market, while their owned devices increasingly lose appeal due to familiarity and boredom (Echegaray, 2016; Van den Berge et al., 2021). Although existing research highlights the importance of preserving the perceived value of owned products to combat premature obsolescence (Magnier & Mugge, 2022; Van Nes, 2016), effective design strategies are underexplored. This study aims to explore design strategies to preserve value of owned consumer electronics, focusing on strengthening their epistemic value to prolong product lifetime and reduce waste.

What is Epistemic Value?

The epistemic value of products is one of five key consumption values that shape consumer decisions (Sheth et al., 1991). Alongside other values (e.g., functional and emotional value), it plays an important role in influencing whether consumers retain or replace a currently owned product. Consumers perceive epistemic value in products through three dimensions: novelty, offering something unexpected or unknown; curiosity, sparking a desire to learn more; and a change of pace, providing variety that breaks daily routines and satisfies the human need for diversity (Magnier & Mugge, 2022; Sheth et al., 1991). However, the psychological trade-offs inherent in epistemic value present a challenge to long-term product use. While epistemic value initially attracts consumers by offering fresh experiences, these experiences can become repetitive and predictable over time, potentially resulting in boredom or satiation. To address this issue, design strategies should focus on sustaining the epistemic value of consumer electronics already in use, thereby reducing the likelihood of premature replacement.

Current Design Strategies

Existing research on enhancing the epistemic value of currently owned consumer electronics has predominantly focused on two approaches. The first is design newness, which leverages the visual novelty aspect of epistemic value by offering consumers visually distinctive design through modifications of aesthetic attributes such as color, shape, and overall form (Mugge & Dahl, 2013; Talke et al., 2017). However, this approach is primarily studied in the context of new product purchases and generally provides only short-lived novelty, as the initial excitement fades quickly. The second approach refers to upgradability, enabling consumers to replace individual components (e.g., processors or batteries) over the product's lifetime (Jaeger-Erben et al., 2023; Khan et al., 2018; Proske & Jaeger-Erben, 2019). For instance, Fairphone employs modular design, enabling consumers to upgrade specific parts as needed. While upgradability can help sustain epistemic value by introducing new functionalities over time, it primarily addresses the technical aspect of design. Together, these two design approaches reflect a narrow portfolio of design strategies, leaving a wide range of other possibilities

unexplored. In this study, we aim to explore the possibility of developing design directions that prolong the lifetime of consumer electronics by strengthening their epistemic value throughout the ownership period.

Methods

To achieve the research objective, we first aim to generate a diverse range of product design concepts that enhance the long-term epistemic value of consumer electronics. To this end, we conducted four two-hour workshop sessions with 24 participants, all of whom held bachelor's degrees in product design. The workshops employed a structured brainstorming approach informed by principles of creative facilitation (Heijne & Van der Meer, 2019). This workshop format has previously been adopted to explore the potential for developing design directions (Ackermann et al., 2021; Casais et al., 2018). Each workshop comprised three brainstorming rounds, during which participants generated design ideas using quick sketches or Post-it notes and then shared their concepts within their groups. To encourage diverse exploration, each round focused on a distinct product category, with three product groups serving as ideation stimuli: (1) Technology Products (e.g., smartphones, laptops, TVs), characterized by regular technological updates; (2) Utilitarian Products (e.g., refrigerators, vacuum cleaners), emphasizing functionality; and (3) Expressive Products (e.g., coffee machines, headphones), associated with self-expression and symbolic meaning. To mitigate pattern bias, the order of product categories varied across workshops. The recorded design ideas (N = 350) and audio transcripts (collected with consent) were subsequently reviewed and analyzed using an inductive thematic analysis approach in Atlas.ti. The first author systematically coded and clustered the ideas to identify emerging design strategies, which were then iteratively reviewed in collaboration with co-authors to ensure conceptual clarity and methodological rigor.

Findings

The data analysis of the design workshops led to the identification of eight overarching design strategies and 19 sub-strategies focused on prolonging the epistemic value of consumer electronics throughout their ownership period. Four strategies address all three dimensions of epistemic value—novelty, curiosity, and change of pace. These strategies include: (1) Hardware Upgradability, which allows consumers to integrate future technical advancements into their device through hardware modifications, aligning with existing upgradability strategies in the literature; (2) Expanded Functionality via Software Upgrades, which enables continuous software updates to provide ongoing benefits beyond mere technical improvements; (3) Multi-Purpose Design, which enhances versatility by allowing products to serve multiple functions or be repurposed for different scenarios; and (4) Dynamic Engagement, which sustains long-term interest through interactive elements and gamification. Additionally, two other strategies specifically emphasize novelty and curiosity. These refers to 5) Anthropomorphism, which focuses on enhancing user engagement by attributing human-like behavior, personalities or characteristics to products; and 6) Adaptability, which enables products to dynamically learn, adjust, and respond to evolving user needs, behaviors, and contexts, thereby increasing their long-term relevance and usability. Finally, our findings highlight the need to expand the original conceptualization of epistemic value (Sheth et al., 1991) by introducing a fourth dimension: preventing the decline of epistemic value over time. This dimension encompasses two key strategies, which refer to 7) Timeless Design, which focuses on evergreen aesthetics and enduring functionality to ensure long-term relevance; and 8) Self-Care, which integrates self-cleaning and maintenance features to preserve a product's aesthetic and functional newness with minimal user effort.

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