The Future of Digital Society: Beauty, Meaning, and Motivation Among Digital Natives

André Delwyn Gopal
University of the Witwatersrand
Station St, Braamfontein,
Johannesburg, Gauteng
South Africa
andre.gopal@wits.ac.za

Abstract

This study investigates the unique role of beauty in digital interface design, moving beyond the traditional focus on usability and functionality. Drawing on a mixed-methods approach, 27 university students engaged with both aesthetically rich (beautiful) and utilitarian (functional) versions of educational and commercial digital platforms. Quantitative results revealed that beautiful interfaces significantly enhance user engagement, trust, and intention to return, whereas qualitative data highlighted beauty's role in fostering motivation, emotional connection, and a sense of care. These effects were found to be robust across domains, suggesting that aesthetics play a foundational role in shaping meaningful digital experiences. By integrating philosophical, psychological, and human-computer interaction perspectives, this research addresses a critical gap: Although usability is well-studied, the societal and motivational impacts of digital beauty remain under-theorized. The author's findings advocate for a new design paradigm that positions beauty as a core value capable of driving user satisfaction, loyalty, and well-being. Practical recommendations for designers, educators, and policymakers aim to future-proof digital society through aesthetics as well as function.

Keywords

digital aesthetics, user engagement, beauty, interface design, human-computer interaction, digital society

Introduction

The Dominance and Limits of the Utilitarian Paradigm

Over the past 30 years, digital design has largely been guided by utilitarian and functionalist thinking. In human-computer interaction (HCI) and UX design, the main priorities have been usability, efficiency, and clarity (Norman, 2013; Nielsen, 1994). This perspective has led to digital interfaces that are easy to use and broadly accessible, building on the idea that good design is about helping users achieve their goals with as little friction as possible (Hassenzahl, 2004). This focus on function has brought significant benefits—especially by improving accessibility and reducing mental effort—but it is becoming clear that this approach is not all-encompassing. As digital technologies shape more aspects of daily life, including education, commerce, activism, and social connection, the shortcomings of a function-first mindset have become noticeable (Bardzell, 2010; Löwgren & Stolterman, 2004).

The Marginalization of Beauty in Digital Contexts

In contrast, beauty has often been pushed to the sidelines in discussions about digital design. It has sometimes been dismissed as a superficial extra rather than a meaningful goal (Tractinsky, 2004). This tendency is not unique to technology; it reflects a long-standing Western tradition that separates what is useful from what is beautiful (Kant, 1790/2000). In practice, beauty has been commonly treated as a luxury, that is, something to be considered only after usability has been addressed, if at all (Norman, 2004). However, new research has suggested that this separation is increasingly hard to justify. Today's users, especially younger generations growing up in visually rich and emotionally engaging digital environments, have begun expecting beauty to be an integral part of meaningful digital experiences (Lavie & Tractinsky, 2004; Forlizzi & Battarbee, 2004).

Rethinking Design: Beauty as a Differentiator

Recent studies have begun to challenge the idea that beauty is an optional or decorative feature. Evidence has shown that aesthetically pleasing interfaces do much more than look good; they have boosted user satisfaction, directly affecting important outcomes like trust, engagement, loyalty, and even how usable a site feels, a phenomenon known as the aesthetic-usability effect (Tractinsky et al., 2000; Tuch et al., 2012). Beauty is not simply a matter of personal taste; it has become a powerful force that shapes users' emotions and motivations, influencing how they connect with digital environments (Hassenzahl, 2010; Bargas-Avila & Hornbæk, 2011). Across areas such as education, e-commerce, and digital activism, beauty has increasingly been seen as a key differentiator that can drive deeper engagement and lead to broader social impact (Ruf et al., 2022; McCarthy & Wright, 2004).

Research Aims and Contributions

Despite mounting evidence, the unique role of beauty in digital society has remained under-theorized and under-measured. Most empirical studies have treated beauty as ancillary to usability, rarely isolating its independent effects or considering its broader societal implications (Bardzell & Bardzell, 2015).

This study seeks to address this gap by systematically investigating the impact of an interface's beauty—as distinct from basic usability and functionality—on user experience, trust, and the perceived meaning of digital interactions.

1. How does the perceived beauty of digital interfaces, independent of functional adequacy, influence young adults' engagement, trust, and sense of meaning across educational, commercial, and civic domains?

2. What emotional, motivational, and cognitive responses are elicited by beautiful, rather than merely functional, digital experiences?

3. How do young adults articulate the value of beauty in digital contexts, and how do these articulations reflect their expectations for the future of digital society?

4. In what ways might prioritizing beauty as a design principle reshape digital education, commerce, and activism, as perceived by digital natives?

5. What features or qualities make a digital interface beautiful from the perspective of young adults, and how do these differ from traditional principles of good design?

Theoretical and Empirical Foundations

Foundational Perspectives on Beauty in Digital Design

The concept of beauty has long been central to philosophical inquiry that continues to shape contemporary thinking about digital design. Immanuel Kant's (1790/2000) influential theory of aesthetics defined beauty as a source of "disinterested pleasure," in which judgments of beauty were not tied to personal desires or practical benefits but understood as universally communicable. For Kant, beauty arose when imagination and understanding aligned in harmony—a dynamic that helps explain why aesthetically engaging digital experiences can resonate widely.

In contrast, Daniel Berlyne's (1971) empirical aesthetics approach grounded beauty in psychological mechanisms, suggesting that aesthetic pleasure resulted from an optimal mix of novelty, complexity, and familiarity. Experiences that achieved this balance sparked curiosity and delight, whereas those that were too simple or too chaotic failed to engage users (Nasar, 1988). These philosophical and psychological perspectives provided a theoretical basis for understanding why certain digital interfaces were more captivating and memorable.

Building on these foundations, research in HCI and UX has increasingly focused on how aesthetics contribute to digital experience. Hassenzahl (2004, 2010) distinguished between pragmatic qualities—such as usability and efficiency—and hedonic qualities, which included stimulation, identification, and positive emotion. Although pragmatic qualities support task completion, hedonic qualities foster pleasure, attachment, and personal meaning, and have been considered essential for sustaining engagement over time.

Don Norman's (2004) theory of emotional design further articulated the importance of aesthetics at three levels: visceral (immediate sensory appeal), behavioral (satisfaction during use), and reflective (lasting impressions and significance). Beauty, in this view, plays a critical role at each stage by attracting users, enhancing their interaction, and shaping their memories and attitudes toward digital products.

Aesthetics, Usability, and Societal Impact

Empirical research in HCI has established usability as a central goal of digital interface design, guided by heuristics and principles such as those proposed by Nielsen (1994), Shneiderman and Plaisant (2010), and Norman (2013). Visual design principles, including contrast, alignment, and consistency, have been widely recognized as essential components of good design (Lidwell et al., 2010). However, recent scholarship has noted that adhering to usability standards alone is insufficient for creating engaging or meaningful digital experiences (Hassenzahl, 2010; Bargas-Avila & Hornbæk, 2011).

A key empirical insight was the aesthetic-usability effect, first documented by Tractinsky, Katz, and Ikar (2000), which demonstrated that users consistently perceived more aesthetically pleasing interfaces as easier to use, even when their objective usability was identical. This finding has been widely replicated (Sonderegger & Sauer, 2010; Tuch et al., 2012), supporting the view that affect and perception are deeply intertwined in digital interaction (Norman, 2004). Lavie and Tractinsky (2004) distinguished between classical aesthetics, focused on order and clarity, and expressive aesthetics, which emphasized creativity and uniqueness, both of which contributed to perceived beauty in digital interfaces.

Beyond usability, aesthetics has strongly influenced engagement, trust, and loyalty. In educational technology, visually appealing platforms increased students' motivation, satisfaction, and perceived learning outcomes (Ruf et al., 2022; Plass et al., 2014). In e-commerce, attractive site design enhanced trust and perceived credibility, driving purchase intent and brand loyalty (Cyr et al., 2006; Sillence et al., 2007). In civic technology and activism, aesthetic quality conveyed professionalism and care, motivating participation and advocacy (Bardzell & Bardzell, 2015; Fimberg & Sousa, 2020).

The broader societal implications of digital beauty have been increasingly recognized. Well-designed digital platforms have lowered barriers to participation, fostered solidarity, and helped amplify the impact of social movements (Costanza-Chock, 2020; Fimberg & Sousa, 2020). Nonetheless, many studies have continued to treat beauty as secondary to usability, and the unique role of aesthetics in fostering meaning, belonging, and social transformation has remained under-theorized (Bardzell, 2010; Bardzell & Bardzell, 2015).

Positioning Beauty Within Digital Design

Taken together, these philosophical, psychological, and empirical perspectives show that beauty should be understood as a foundational principle in digital design. Although the functionalist paradigm remains important, it is not sufficient to create meaningful, motivating, and trustworthy digital experiences. Beauty can act as a catalyst for engagement and meaning, and it can be intentionally designed for, measured, and validated. By placing beauty at the heart of digital design—rather than treating it as an optional extra—designers can address what users do, and how digital experiences make users feel, including who they can become through interaction (Hassenzahl, 2010; McCarthy & Wright, 2004).

This integrated perspective has become essential for building digital content that is resilient, meaningful, and capable of driving positive societal change. As digital technologies continue to shape the fabric of everyday life, a design paradigm that balances functionality and aesthetics has become necessary to support users' well-being and collective flourishing.

Methods

Research Design

This study employed a within-subjects mixed-methods experimental design to systematically isolate and examine the effects of interface beauty, independent of functional adequacy, on young adults' engagement, trust, and meaning-making across educational and commercial digital contexts. The mixed-methods approach was selected to provide robust quantitative measurement of aesthetic and engagement effects, while also capturing rich qualitative insights into participants' subjective experiences and expectations (Creswell & Plano Clark, 2018). Each participant interacted with both beautiful and functional versions of interfaces in both domains, enabling direct comparison and minimizing inter-participant variance (Tuch et al., 2012).

Participants and Sampling

A total of 27 university students (aged 18-25) participated in the study. Of these, 18 identified as female (66.7%) and 9 as male (33.3%). Participants represented a range of academic backgrounds: 11 were enrolled in Humanities (40.7%), 2 in Commerce (7.4%), 8 in Engineering (29.6%), and 6 in Sciences (22.2%).

Recruitment was conducted using electronic mailing lists and classroom announcements at the University of the Witwatersrand. Interested students contacted the research team and were screened for eligibility; inclusion criteria required participants to be regular users of digital platforms in both educational and commercial contexts. Recruitment continued until the target sample size was reached.

Prior to participation, all students received a digital information sheet outlining the study's purpose, procedures, risks, and confidentiality measures. Written informed consent was obtained from each participant, in compliance with institutional ethical guidelines.

Participants were randomly assigned to different interface orderings. Each participant completed the study individually in a quiet, supervised laboratory setting. Before beginning, participants were given standardized verbal and written instructions explaining the study workflow, task requirements, and the confidential nature of their responses. They were informed that the study aimed to understand experiences with different digital interfaces, but they were not told the specific hypotheses regarding aesthetics.

Timing was carefully controlled: Participants were allotted up to 5 min per interface to complete the assigned tasks, with most completing each set in 1-2 min. The full study session, including instructions, task completion for all interfaces, questionnaire responses, and open-ended reflections, lasted approximately 15 min per participant.

Materials and Interface Design

The experimental materials consisted of two sets of web-based digital interfaces, each representing a core societal domain: an education/e-learning platform and an e-commerce storefront. For each domain, two distinct versions were created. The beautiful version design exhibited contemporary best practices in visual aesthetics from existing websites and applications, including harmonious and rich color palettes, high-quality imagery, considered typography, sophisticated layout, micro-interactions, and scroll and click animations, drawing on

established aesthetic principles (Lavie & Tractinsky, 2004; Moshagen & Thielsch, 2010). The functional version design met all usability heuristics (Nielsen, 1994), but aesthetic embellishment was intentionally minimized by using basic colors, simple layouts, and default typography.

Both versions, in each domain, were matched for content, structure, and features to ensure any observed effects could be attributed to aesthetics rather than functional differences. We developed prototypes in Figma, modeling existing web interfaces, and pilot-tested them for technical reliability and equivalence of usability.

Appendix A includes representative screenshots of each interface version to illustrate the distinct features of the beautiful and functional interfaces used in the study. These images highlight key design elements, such as color schemes, typography, imagery, layout complexity, interactive features, and visual hierarchy. The beautiful interfaces were characterized by harmonious color palettes, high-quality images, refined typography, smooth animations, and outstanding visual hierarchy while adhering to accepted visual design principles. The beautiful interfaces were also subjectively creative in their execution of the visual design principles. The functional interfaces utilized basic colors, functional layouts, standard fonts, and minimal decorative elements.

Measures
Quantitative Measures:

For each of the 4 interface conditions (Education-Beautiful, Education-Functional, Commerce-Beautiful, Commerce-Functional), participants completed the following:

- Visual Aesthetics of Websites Inventory (VisAWI): 18 items, 7-point Likert scale; total possible score 18–126 (Moshagen & Thielsch, 2010), with subscales:
  - Simplicity (4–28)
  - Diversity (4–28)
  - Colorfulness (3–21)
  - Craftsmanship (7–49)
- User Engagement Scale – Short Form (UES-SF): 12 items, 1-5 Likert scale; total possible score 12–60 (O'Brien et al., 2018)
- Trust, Recommend, Return: Each measured with a single-item, 1-5 Likert scale (adapted from Cyr et al., 2006; Corritore et al., 2003):
  - "I trust this website."
  - "I would recommend this website to a friend."
  - "I would return to this website in the future."

Qualitative Measures:

- Open-ended reflections: After exposure to each interface, participants responded to prompts on:
  - Emotional and motivational responses (for example, "How did this interface make you feel?")
  - Perceived meaning and value of beauty in digital experiences, that is, whether and how beauty contributed to a sense of purpose, value, or care
  - Expectations for beauty and design in the future digital society, or in this context

Articulation of what features made the interface beautiful or otherwise.

Procedure

1. **Consent and Briefing:** Participants provided informed consent and were briefed on the study's purpose, without revealing specific hypotheses about interface aesthetics.

2. **Randomization:** Participants were randomly assigned to interact with interface stimuli in a counterbalanced order to control for sequence effects.

3. **Interface Interaction and Task Completion:**

   For each interface (both beautiful and functional versions within the education and commerce domains), participants completed two standardized tasks per interface.

   Educational Platforms:

   a. **Content navigation task:** Locate and open a specified educational resource or lesson.

   b. **Interactive engagement task:** Complete a basic activity such as answering a quiz question, submitting a response, or reviewing a lesson summary.

   E-commerce Platforms:

   a. **Product search task:** Find a specific product.

   Each task was designed to be straightforward and to reflect typical user interactions for each domain. Tasks were matched and kept as similar as possible across all interface versions to isolate the effect of interface aesthetics. All tasks were completed using interactive Figma prototypes, which accurately replicated the visual and interactive features of the original websites, ensuring usability on the surface.

   Task Duration:

   Participants were allotted up to 5 min per interface to complete both tasks, but most tasks could be completed comfortably within 1-2 min. The time was monitored to ensure consistency across participants and conditions.

4. **Questionnaires:** Immediately following each interaction with an interface, participants completed the VisAWI, UES-SF, and the Trust, Recommend, Return items related to that interface.

5. **Qualitative Reflections:** After completing both interfaces within a given domain, participants provided open-ended reflections addressing their emotional, motivational, and cognitive responses.

6. **Debriefing:** Upon completion of all conditions, participants were debriefed about the study's aims and had the opportunity to provide any final comments.

This procedure ensured that each participant completed the same set of tasks for both beautiful and functional versions within each domain, allowing for a direct, within-subjects comparison of user experiences. Full item wordings and prompts for all measures are in Appendix C.

Data Analysis

Quantitative Analysis:

- Descriptive statistics were calculated for all scale-based measures (VisAWI Total and subscales, UES-SF, and the Trust, Recommend, Return items).
- A repeated-measures ANOVA was used to assess the main effects of interface type (Beautiful versus Functional) and domain (Education versus Commerce), as well as their interaction, on all quantitative outcomes.
- Post hoc comparisons were conducted with a Bonferroni correction, where appropriate.
- Reliability (Cronbach's alpha) was reported for all multi-item scales.

Qualitative Analysis:

- Thematic analysis (Braun & Clarke, 2006) was conducted on all written responses. The full qualitative codebook (codes, definitions, and quotes) is in Appendix B.
- Responses were coded inductively by two independent researchers; disagreements were resolved through discussion.

- Emergent themes were mapped to the research questions, with attention to emotional, motivational, and cognitive responses, articulations of beauty's value, and expectations for the future of digital society.

Results

This study employed a mixed-methods approach to examine the impact of interface aesthetics on user experience in educational and commercial digital platforms. Twenty-seven participants evaluated both beautiful and functional versions of educational and commercial interfaces, resulting in data for a fully crossed within-subjects design. For each condition, participants provided quantitative ratings on validated psychometric scales as well as open-ended qualitative responses.

The final sample comprised 27 participants ($N = 27$), who each completed all conditions, resulting in no missing data for either the quantitative or qualitative measures. An analysis of quantitative data used a two-way repeated-measures ANOVA to assess the main effects and interaction effects of interface type (Beautiful versus Functional) and domain (Education versus Commerce) on engagement and trust, intention to recommend, and intention to return. Paired-samples t-tests further explored any significant differences.

Qualitative data from open-ended responses were analyzed using thematic analysis, following Braun & Clarke's (2006) approach. Responses, coded inductively, helped identify recurring themes related to emotional and motivational responses, perceived meaning and the value of beauty, salient interface features, and future expectations.

An assessment of internal consistency for each of the main dependent variable measures used Cronbach's alpha coefficient. The VisAWI demonstrated excellent internal reliability (Cronbach's α = 0.93). The UES-SF also showed high internal consistency (Cronbach's α = 0.91). These values indicate that both multi-item scales used in the study were highly reliable for the current sample.

Quantitative Results

Aesthetic Perceptions (VisAWI)

Descriptive statistics for the Visual Aesthetics of Websites Inventory (VisAWI) and its subscales are presented in Table 1. As shown, both domain (Education and Commerce) and interface type (Beautiful and Functional) were associated with distinct patterns of aesthetic evaluation.

Table 1. Means (and Standard Deviations) for VisAWI Total and Subscales by Domain and Interface Type ($N = 27$ per group)

Measure	Education-Beautiful Mean	Education-Functional Mean	Commerce-Beautiful Mean	Commerce-Functional Mean
VisAWI_Total	114.70 (5.86)	90.04 (4.89)	117.74 (4.66)	91.44 (1.86)
Simplicity	25.19 (1.96)	19.67 (1.68)	26.00 (1.82)	19.93 (1.11)
Diversity	24.41 (1.95)	17.89 (1.37)	25.41 (1.98)	18.22 (1.14)
Colorfulness	16.78 (1.62)	13.33 (1.21)	18.33 (1.40)	13.96 (1.11)
Craftsmanship	48.33 (1.17)	39.15 (1.73)	48.00 (1.60)	39.33 (1.16)

To examine the effects of interface type and domain, VisAWI scores were aggregated across domains and interface types, respectively (Table 2).

Table 2. Main Effects of Interface Type and Domain on VisAWI Scores (*N* = 54 per Level)

Measure	Beautiful Mean	Functional Mean	Mean Diff	Education Mean	Commerce Mean	Mean Diff
VisAWI_Total	116.22	90.74	25.48	102.37	104.59	2.22
Simplicity	25.60	19.80	5.80	22.43	22.97	0.54
Diversity	24.91	18.06	6.85	21.15	21.82	0.67
Colorfulness	17.56	13.64	3.92	15.05	16.15	1.10
Craftsmanship	48.17	39.24	8.93	43.74	43.66	-0.08

A two-way repeated-measures ANOVA examined the effects of interface type (Beautiful versus Functional) and domain (Education versus Commerce) on aesthetic perception as measured by the VisAWI.

The results revealed a significant main effect of interface type, $F(1, 26) = 45.37$, $p < .001$, $\eta^2 = 0.64$, with beautiful interfaces ($M = 5.8$, $SD = 0.7$) rated significantly higher in aesthetic appeal than functional interfaces ($M = 3.1$, $SD = 0.9$).

There was no significant main effect of domain, $F(1, 26) = 1.62$, $p = .213$, $\eta^2 = 0.06$, indicating that aesthetic ratings did not differ significantly between educational and e-commerce platforms overall.

The interaction effect between interface type and domain was not significant, $F(1, 26) = 2.04$, $p = .166$, $\eta^2 = 0.07$, suggesting that the difference in aesthetic ratings between interface types was consistent across both domains.

Table 3. Main Effects of Interface Type and Domain on VisAWI Scores (*N* = 54 per Level)

Effect	*F*	*df*	*p*-value	Partial η²
Interface type	45.37	1.26	<.001	0.64
Domain	1.62	1.26	.213	0.06
Type × Domain	2.04	1.26	.166	0.07

User Engagement (UES-SF)

Descriptive statistics for user engagement scores (as measured by the UES-SF, range 12-60) are presented in Table 4. For both domain types (Education and Commerce), engagement ratings were markedly higher for Beautiful compared to Functional interface types.

Table 4. Means and Standard Deviations for User Engagement by Domain and Interface Type

Domain	Interface Type	N	Engagement *M*	Engagement *SD*
Education	Beautiful	27	53.00	2.18
Education	Functional	27	33.30	2.02
Commerce	Beautiful	27	55.00	1.54
Commerce	Functional	27	34.80	1.48

Marginal means, collapsed by interface type and domain, are shown in Table 5 for comparison.

Table 5. Marginal Means of User Engagement by Interface Type and Domain

Grouping	N	Engagement M	Engagement SD
Beautiful	54	54.00	2.00
Functional	54	34.10	1.80
Education	54	43.20	9.97
Commerce	54	44.90	10.13

A series of paired-samples *t*-tests revealed that engagement scores were dramatically higher for Beautiful versus Functional interfaces in both domains. For Education, the difference was highly significant, $t(26) = 36.51$, $p < .001$, $d = 7.03$. For Commerce, the difference was even larger, $t(26) = 54.57$, $p < .001$, $d = 10.50$.

A two-way repeated-measures ANOVA supported these findings:

1. There was a very large main effect of interface type on engagement, $F(1,26) = 2550.11$, $p < .001$, $η² = .99$, with Beautiful interface types ($M = 54.00$, $SD = 2.00$) consistently rated much higher than Functional interface types ($M = 34.10$, $SD = 1.80$).
2. A main effect of domain was also observed, $F(1,26) = 15.23$, $p < .001$, $η² = .37$, with engagement slightly higher for Commerce ($M = 44.90$, $SD = 10.13$) than for Education ($M = 43.20$, $SD = 9.97$).
3. The interaction between interface type and domain was significant, $F(1,26) = 8.72$, $p = .007$, $η² = .25$, indicating the difference between Beautiful and Functional interface types was marginally larger for Commerce ($ΔM = 20.2$) than Education ($ΔM = 19.7$).

Trust, Recommendation, and Return Intention

Across both domains, Education and Commerce, ratings for all three measures were substantially higher for Beautiful than Functional interface types. Table 6 presents descriptive statistics for the Trust, Recommend, and Return items.

Table 6. Means (and Standard Deviations) for Trust, Recommendation, and Return by Domain and Interface Type

Domain	Interface Type	N	Trust M	Recommend M	Return M
Education	Beautiful	27	5.00 (0.00)	5.00 (0.00)	4.85 (0.36)
Education	Functional	27	3.00 (0.46)	3.00 (0.46)	2.44 (0.51)
Commerce	Beautiful	27	4.96 (0.19)	4.96 (0.19)	4.93 (0.27)
Commerce	Functional	27	3.00 (0.27)	3.00 (0.27)	2.11 (0.32)

Table 7 shows marginal means by interface type and domain.

Table 7. Marginal Means for Trust, Recommendation, and Return

Grouping	N	Trust M	Recommend M	Return M
Beautiful	54	4.98 (0.14)	4.98 (0.14)	4.89 (0.32)
Functional	54	3.00 (0.37)	3.00 (0.37)	2.28 (0.44)
Education	54	4.00 (1.15)	4.00 (1.15)	3.65 (1.24)
Commerce	54	3.98 (1.12)	3.98 (1.12)	3.52 (1.33)

Paired-samples *t*-tests revealed that intentions of Trust, Recommendation, and Return were all significantly higher for Beautiful than Functional interfaces within each domain. For example, in Education, Trust ($t(26) = 21.98$, $p < .001$, $d = 4.23$), Recommendation ($t(26) = 21.98$, $p < .001$, $d = 4.23$), and Return ($t(26) = 20.25$, $p < .001$, $d = 3.89$) all showed very large effects. In Commerce, these effects were even greater (Trust: $t(26) = 36.28$, $p < .001$, $d = 6.98$;

Recommendation: $t(26) = 36.28$, $p < .001$, $d = 6.98$; Return: $t(26) = 47.43$, $p < .001$, $d = 9.12$).

A two-way repeated-measures ANOVA indicated a very large main effect of interface type for each measure (Trust: $F(1,26) = 1123.1$, $p < .001$, $\eta^2 = .98$; Recommend: $F(1,26) = 1123.1$, $p < .001$, $\eta^2 = .98$; Return: $F(1,26) = 1054.3$, $p < .001$, $\eta^2 = .98$). There were no significant main effects for domain (for all: $F < 2.05$, $p > .15$) and no significant interactions (for all: $F < 2.10$, $p > .15$).

Qualitative Results

Emotional and Motivational Responses

Participants consistently described Beautiful interfaces as energizing, motivating, and uplifting (Table 7). In educational contexts, beauty was linked to feeling "invited," "curious," and "excited to learn." P1: "This interface felt inviting and energizing. The visuals made me want to explore more." P7: "I was excited to learn. The design drew me in instantly." Commerce sites with beautiful design evoked feelings of "trust," "happiness," and "fun," with many participants stating that beauty made shopping "a pleasure" or "fun and rewarding." P1: "The site looked so good I trusted it immediately. Shopping felt fun and effortless." P27: "Shopping was fun and rewarding. The site looked amazing and felt safe."

In contrast, Functional interfaces—although always described as usable—were frequently called "bland," "uninspiring," or "dull." Many participants reported feeling little motivation to stay or explore. P5: "I lost interest quickly." P1: "Nothing really caught my eye." Several participants described these interfaces as "forgettable" or "just another generic site," especially for Commerce.

Perceived Meaning and Value of Beauty

Thematic analysis revealed that participants saw digital beauty as signaling care, value, and importance. P1 stated that beauty "made the lesson feel valuable and showed attention to detail." P8 stated that it "made the content feel thoughtfully crafted." In commerce, beauty was seen as a marker of professionalism and trustworthiness: "A beautiful design made me feel like the products were high quality and worth my time" (P1). "Beauty made me trust the store and want to return" (P27).

By contrast, functional, plain designs were often described as "generic," "impersonal," or "routine," with some participants saying they felt "no sense of value or care in the design" (P19). P1 noted that plain design "didn't inspire me" and that it failed to make the experience "feel special."

Features Noted as Beautiful

When prompted to identify what made an interface feel beautiful, participants consistently mentioned elements such as color, imagery, layout, and animation, commenting on these features:

    a. "Bright colors, soft gradients, and clear icons" (P1)

    b. "Well-chosen fonts, colorful accents, and nice spacing" (P2)

    c. "Animated graphics, soft color palettes, and modern fonts" (P5)

    d. "High-res images, smooth animations, and coordinated color schemes" (P1)

    e. "Vivid product photos, subtle transitions, and matching colors" (P3)

Participants also highlighted the role of creative icons, dynamic visuals, and interactive features in making both educational and commercial platforms stand out. In contrast, functional interfaces were characterized by "minimal colors, basic layout, and no imagery" (P1), "standard fonts, simple layout, and minimal color" (P19), or "plain product pages, basic buttons, and little movement" (P15).

Future Expectations and Societal Implications

Across both domains, participants expressed a strong desire for beauty to become a standard expectation in digital platforms. For education, there was a recurring hope that future learning tools would be "this visually impressive" (P2) and that "all courses in the future look this good and make learning engaging" (P5). Several commented that "beauty should be a top priority" and that "learning platforms should invest in aesthetics" (P27).

In commerce, participants expected beautiful design to become "the norm for shopping" (P14) and indicated that "I'll choose shops that look and feel beautiful, not just ones that work" (P1). Many saw beautiful design as directly tied to their loyalty and willingness to return: "I hope beauty becomes standard for online shops" (P26), and "I expect all shops to focus on beautiful, engaging design" (P27).

Table 8. Summary of Key Themes

Theme	Beautiful Interfaces	Functional Interfaces
Emotional Response	Energized, motivated, happy, trusting	Bland, uninspired, indifferent
Perceived Value	Cared for, valued, important, trustworthy	Generic, impersonal, routine, forgettable
Noted Features	Colors, images, animation, creative layout	Minimal color, plain layout, few visuals
Future Expectations	Beauty as standard, driving engagement and loyalty	Hope for more creativity and aesthetics

Integration of Quantitative and Qualitative Findings

The combined analysis of quantitative and qualitative data revealed a remarkably consistent narrative: Visual beauty exerts a powerful and multifaceted influence on user experience across both educational and commercial digital platforms.

Converging Patterns

Quantitative results demonstrated that beautiful interfaces outperformed functional interfaces by a large margin on every measured dimension, including aesthetic appreciation (VisAWI), engagement, and trust, the intention to recommend, and the intention to return. These effects were both statistically robust and practically meaningful, with effect sizes often in the very large range (η^2 = .98 for Trust and Recommendation). Notably, although the domain (Education versus Commerce) had minor or inconsistent effects, interface aesthetics were the primary driver of positive outcomes.

The qualitative findings strongly reinforced these patterns. Participants routinely described Beautiful interfaces as energizing, motivating, and emotionally rewarding, and reported that beauty signaled value, care, and even trustworthiness. They articulated a clear sense that beautiful design elevated their willingness to explore, learn, shop, and return.

The integration of these findings suggests that the impact of beauty is not merely cosmetic. Rather, beauty functions as a signal of intentionality and care—qualities that participants interpreted as evidence of higher value and trustworthiness. This perception translated directly into heightened engagement and loyalty intentions, as reflected in both high quantitative scores and rich qualitative descriptions ("The site looked so good I trusted it immediately," and "Beauty made the lesson feel valuable and showed attention to detail" (P1)).

The features that drove these perceptions—color, imagery, animation, layout—were consistently identified in both statistical and open-ended responses as distinguishing beautiful interfaces from their functional counterparts.

Importantly, although all participants found functional interfaces usable, both the quantitative and qualitative data show that mere usability is insufficient to drive positive emotion, perceived value, or future loyalty. Quantitative engagement and return scores were dramatically lower for functional interfaces, and participants' comments painted these experiences as "dull," "forgettable," and "uninspiring."

The few, subtle differences between educational and commercial domains observed in the numbers (slightly higher engagement for Commerce) were echoed in qualitative comments. Beauty in commerce is particularly linked to trust and perceptions of product quality, whereas in education, it is linked to motivation and a sense of care.

Discussion

This study aimed to investigate how the perceived beauty of digital interfaces, independent of their functional adequacy, shapes young adults' engagement, trust, and sense of meaning across educational and commercial contexts. The results—both quantitative and qualitative—indicate that visual beauty is not a mere decorative afterthought but a powerful, multifaceted driver of positive digital experience.

Quantitatively, beautiful interfaces outperformed their merely functional counterparts by a large margin on every measured dimension: aesthetic appreciation (VisAWI), user engagement (UES-SF), trust, willingness to recommend, and intention to return. These effects were statistically robust, with very large effect sizes ($\eta^2 = .98$ for Trust and Recommend), and were consistent across both education and commerce domains.

Qualitatively, participants consistently described beautiful interfaces as energizing, motivating, and emotionally rewarding. Beauty was seen as a marker of care, value, and trustworthiness, whereas functional but plain designs were labeled generic, uninspiring, and forgettable. Importantly, usability alone was not sufficient to generate positive emotional or motivational responses, highlighting the unique and foundational role of beauty in digital design.

Interpreting the Role of Beauty in Digital Experience

Engagement, Trust, and Meaning-Making

The findings provide strong empirical support for the argument that beauty is not a trivial embellishment, but a core element of meaningful digital experience. Across both educational and commercial platforms, beautiful interfaces significantly enhanced user engagement, trust, and a sense of value—effects that persisted even when functional adequacy was held constant.

These results are consistent with, and extend, the aesthetic-usability effect described by Tractinsky et al. (2000), which posits that users perceive beautiful interfaces as more usable, regardless of objective functionality. The data in this study extends this by showing that beauty also strengthens users' trust and loyalty intentions, echoing Hassenzahl's (2010) distinction between pragmatic (task-oriented) and hedonic (pleasure-oriented) qualities in digital experience.

Moreover, the study's qualitative data reveal that beauty plays a critical role in meaning-making. Participants repeatedly articulated that beauty signaled care and intentionality on the part of designers, and they translated that into a sense of being valued as users (McCarthy & Wright, 2004). In both education and commerce, beauty elevated the perceived importance of the content or service and fostered a deeper emotional connection.

This work thus bridges philosophical traditions, such as Kant's (1790/2000) theory of beauty as "disinterested pleasure" and a universal communicative value, with contemporary psychological and HCI perspectives. Whereas prior research has acknowledged the importance of usability and functionality (Nielsen, 1994; Norman, 2013), these findings highlight a significant research gap: the unique, independent effects of beauty on digital engagement and societal impact remain under-theorized and under-measured (Bardzell & Bardzell, 2015; Bargas-Avila & Hornbæk, 2011).

Emotional and Motivational Power of Beauty

The qualitative analysis underscores beauty's profound emotional and motivational power. Participants described beautiful interfaces as "energising," "inviting," and "uplifting," often linking these feelings to increased motivation to learn, shop, or explore. In contrast, functional interfaces were frequently labeled as "bland," "uninspiring," or "forgettable," regardless of their usability.

These emotional responses are not merely transient; they have practical consequences for user behavior. Beauty was associated with increased intentions to return and make a recommendation, suggesting that aesthetic quality can foster habit-formation and long-term loyalty, a phenomenon supported by prior research on the affective dimensions of digital experience (Kim et al., 2016; Moshagen & Thielsch, 2010).

From a psychological perspective, these findings align with positive psychology's emphasis on the role of aesthetic experiences in human flourishing (Seligman, 2011) and with Berlyne's (1971) arousal theory, which links optimal complexity and novelty to pleasure and sustained interest. By integrating these insights with HCI and design frameworks, this study highlights the potential for beauty to drive individual engagement as well as collective trust and social transformation (Costanza-Chock, 2020).

Bridging Disciplines

By drawing on philosophy, psychology, HCI, and design, this research provides a much-needed interdisciplinary framework for understanding beauty's unique effects in digital contexts. Usability and function remain essential design goals; in addition, this study, supported by robust empirical evidence, suggests that beauty offers a distinct, under-explored pathway to digital engagement, trust, and societal impact.

As digital technologies become ever more central to education, commerce, and activism, it is imperative for scholars and practitioners to move beyond the utilitarian paradigm and recognize beauty as a foundational—and actionable—design principle. Only by doing so can we fully harness the potential of digital aesthetics to foster meaningful, motivating, and trustworthy digital societies.

Beauty as a Design Principle for the Future

Domain-Specific Implications

In educational contexts, beautiful digital interfaces were strongly linked to heightened motivation, curiosity, and willingness to engage with learning content. Participants described beautiful educational platforms as "inviting," "energizing," and "showing care," suggesting that design aesthetics can communicate institutional investment in student well-being and success. This aligns with research in educational psychology, which highlights the importance of positive emotions and perceived support for deeper learning and persistence (Plass et al., 2014; Seligman, 2011). Integrating beauty into educational technology is therefore not a luxury but a strategic means to foster student engagement, satisfaction, and even academic achievement.

In the commercial domain, aesthetics played a decisive role in shaping trust, shopping intentions, and brand loyalty. Beautiful e-commerce interfaces were consistently associated with perceptions of professionalism, quality, and safety, echoing prior findings that visual appeal enhances credibility and purchase intent (Cyr et al., 2006; Sillence et al., 2007). Participants reported a greater willingness to return to and recommend beautifully designed stores, indicating that beauty can drive not just individual transactions but long-term customer relationships and brand advocacy. For businesses, investing in digital aesthetics is thus a powerful lever for differentiation in increasingly competitive markets.

Societal and Ethical Implications

Prioritizing beauty in digital design has the potential to reshape user expectations, setting new standards for what is considered acceptable or desirable in digital experiences. As younger generations encounter more beautiful and thoughtfully designed platforms, they may come to expect higher levels of care and intentionality in all their digital interactions (Lavie & Tractinsky, 2004). This trend could drive a cultural shift, encouraging organizations to move beyond minimum viable products toward experiences that are emotionally meaningful and human-centered.

At a broader societal level, beauty can serve as a catalyst for what might be termed digital flourishing, or the idea that digital technologies can actively contribute to human well-being, trust, and collective progress (McCarthy & Wright, 2004; Seligman, 2011). When digital spaces are beautiful, they attract and retain users and also communicate respect, care, and value,

potentially enhancing civic participation, social trust, and a sense of belonging (Costanza-Chock, 2020). Ethically, this suggests a responsibility for designers and institutions to consider the affective and societal impacts of their work, not just its functionality.

Practical Implications for Design and Policy

The findings of this study offer several actionable recommendations for designers, educators, and policymakers.

Designers should treat beauty as a primary design objective, not an afterthought. Incorporate principles of color, imagery, movement, typography, layout, and animation early in the design process, and validate their impact through user testing that includes both hedonic and pragmatic measures. Educators and platform developers must recognize that investment in digital aesthetics can enhance motivation, perceived care, and learning outcomes. We must prioritize visual and experiential quality in educational technology procurement and development.

Businesses should understand that beautiful interfaces foster trust, retention, and advocacy. Policymakers must develop and promote digital design standards that explicitly include aesthetics alongside usability and accessibility, and they should encourage public institutions to adopt best practices in digital beauty, supporting societal well-being and inclusion.

In sum, integrating beauty into digital design standards is not simply about making things look good; it is about creating digital environments that foster trust, engagement, and flourishing for all users.

Beauty as Temporally Situated Yet Measurable

A longstanding critique of aesthetic research is that judgments of beauty are subjective and historically contingent. Stylistic canons do evolve, and cultures and cohorts differ in their aesthetic priors. The claim of this research, however, is not that a particular palette, typeface, or motion pattern is timeless. Rather, the study isolates a stable mechanism: When functionality is held constant, interfaces that are perceived as more beautiful—operationalized through a validated aesthetic instrument—reliably elicit higher engagement, trust, and a willingness to return among digital natives.

Two lines of theory support this stance. First, Kant's analysis of judgments of taste as "universally communicable" points to a shareable dimension of aesthetic appraisal beyond idiosyncratic preference (Kant, 1790/2000). Second, Berlyne's empirical aesthetics explains aesthetic pleasure through optimal arousal, balancing novelty, complexity, and familiarity (Berlyne, 1971). Although what counts as prototypical or novel shifts over time, the underlying relationship between aesthetic appraisal and affect (motivation) is expected to persist (cf. Tuch et al., 2012; Hassenzahl, 2010).

The findings of this research are strongest for digital natives within the present design zeitgeist and for the tasks and domains tested. We therefore frame generalizability as principled but bounded. The mechanism linking perceived beauty to motivational and trust outcomes is stable; the surface features that instantiate beauty vary. This distinction preserves the theoretical and practical value of our results while inviting multi-site, cross-cultural, and longitudinal replications to map how aesthetic canons evolve.

Conclusion

This study reaffirms the importance of beauty as a core value in digital design, extending far beyond mere decoration or usability. By demonstrating that aesthetically rich interfaces significantly enhance engagement, trust, and perceived value, the findings highlight beauty's unique and under-appreciated impact on digital experiences for digital natives.

This research contributes new evidence that beauty, when integrated intentionally into educational and commercial platforms, fosters motivation, loyalty, and a sense of care—benefits that usability alone cannot provide. These insights have broad societal significance, suggesting that digital environments can actively support well-being and collective flourishing when aesthetics are prioritized alongside function.

There is a clear need for a new design paradigm that balances functionality with beauty as equally essential pillars. As digital technologies continue to shape the fabric of everyday life, designers, educators, and policy-makers must recognize aesthetics not as an optional extra, but as a fundamental ingredient of meaningful digital interaction.

Future-proofing digital society will require ongoing commitment to aesthetics, ensuring that digital spaces remain engaging, trustworthy, and enriching for all users. Embracing beauty as a design principle is not just about better interfaces—it is about building a digital culture that values both utility and the human spirit.

Limitations

This study has several limitations. The sample comprised 27 university students from a single institution, limiting generalizability to other populations or age groups (Etikan, 2016). The controlled, laboratory-like setting with prototyped interfaces may not fully capture the complexities of real-world digital use (Bargas-Avila & Hornbæk, 2011). A post-hoc power analysis (G*Power 3.1) was conducted for the repeated-measures ANOVA comparing interface type. With an observed large effect size ($f = 0.95$, based on partial $\eta^2 = 0.64$), $\alpha = .05$, and $N = 27$, the achieved power was 0.99, indicating that the sample size was adequate for detecting large effects. However, the sample may have been insufficient to reliably detect medium or small effects, particularly for interactions or secondary outcomes.

One limitation of the study is the absence of objective usability metrics—such as effectiveness, efficiency, and satisfaction—for each interface. The study assessed user perceptions and subjective experiences, but it did not collect behavioral or performance-based data that could provide a more comprehensive understanding of usability across conditions. As a result, the findings primarily reflect participants' self-reported impressions rather than direct measures of how easily or efficiently users could complete tasks. Additionally, reliance on self-report and qualitative reflection introduces potential response bias and subjectivity (Braun & Clarke, 2006). Nonetheless, the strong alignment between quantitative and qualitative results supports the robustness of the findings, and future research with larger samples is recommended to confirm and extend these findings.

Tips for UX Practitioners

This study shows that beauty is not a veneer but a measurable driver of outcomes when function is held constant. Across education and commerce, more beautiful interfaces yielded large gains in engagement (≈+20 points on UES-SF in our sample) and substantial increases in trust, recommendations, and the intention to return (≈+2 points on 1-5 items). Treat beauty as a priority requirement with clear standards and tests.

This study demonstrates that digital beauty is not a superficial extra, but a core driver of user engagement, trust, and the intention to return—across both educational and commercial platforms. Based on the findings and current literature, the following actionable strategies for UX practitioners—across digital and other domains—are recommended:

1. Prioritize visual beauty alongside usability. The findings show that even perfectly functional interfaces fail to inspire engagement or loyalty if they appear bland. Invest in visual design elements such as harmonious color schemes, high-quality imagery, elegant typography, animated transitions, and well-designed elements (SVG illustrations, for example) to create a sense of care and value that users immediately perceive.

2. Signal trust and quality through aesthetics and craftsmanship. Users in this study reported higher trust and willingness to recommend or return when sites looked beautiful. By using cohesive branding, thoughtfully designed layouts and elements, and polished details, one can create a first impression of professionalism and reliability, especially in e-commerce and other domains where trust is critical.

3. Design for emotional engagement. Beyond usability, beauty evokes positive emotions like curiosity, motivation, and enjoyment. Incorporate creative illustrations, playful icons, and visually inviting layouts to foster emotional connections and mental

engagement. This is particularly important in learning and engagement-focused domains.

4. Iterate with real user feedback. Regularly test prototypes for emotional as well as functional impact. Ask users if they can use your product and, more importantly, if they want to. Do they feel inspired, curious, or excited by the experience? Use open-ended questions to uncover the value users assign to beauty; test for hedonic outcomes.

5. Set beauty as a minimum standard. The next generation of users expects digital beauty as a baseline, not a bonus. Make visual excellence a non-negotiable part of your design process and advocate for adequate resources and time to achieve it.

In sum, investing in beauty is a strategic imperative, not a luxury. Beautiful digital products are more likely to be trusted, recommended, and revisited. This finding is true across domains and aligns with growing evidence in UX and consumer psychology literature.

References

Bardzell, S. (2010). Feminist HCI: Taking stock and outlining an agenda for design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10, pp. 1301–1310). Association for Computing Machinery. https://doi.org/10.1145/1753326.1753521

Bardzell, S., & Bardzell, J. (2015). *Humanistic HCI*. Morgan & Claypool.

Bargas-Avila, J., & Hornbæk, K. (2011). Old wine in new bottles or novel challenges? A critical analysis of empirical studies of user experience. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 2689–2698). Association for Computing Machinery. https://doi.org/10.1145/1978942.1979336

Berlyne, D. E. (1971). *Aesthetics and psychobiology*. Appleton-Century-Croft.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Corritore, C. L., Kracher, B., & Wiedenbeck, S. (2003). On-line trust: Concepts, evolving themes, a model. *International Journal of Human-Computer Studies*, *58*(6), 737–758. https://doi.org/10.1016/S1071-5819(03)00041-7

Costanza-Chock, S. (2020). *Design justice: Community-led practices to build the worlds we need*. MIT Press.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE.

Cyr, D., Head, M., Larios, H., & Pan, B. (2009). Exploring human images in website design: A multi-method approach. *MIS Quarterly*, *33*(3), 539–566. https://doi.org/10.2307/20650308

Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Fimberg, K., & Sousa, S. (2020). The impact of website design on users' trust. In *Proceedings of the 22nd International Conference on Human-Computer Interaction with Mobile Devices and Services* (pp. 1–5). Association for Computing Machinery. https://doi.org/10.1145/3419249.3420086

Forlizzi, J., & Battarbee, K. (2004). Understanding experience in interactive systems. In *Proceedings of the 5th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques* (DIS '04, pp. 261–268). Association for Computing Machinery. https://doi.org/10.1145/1013115.1013152

Hassenzahl, M. (2004). The interplay of beauty, goodness, and usability in interactive products. *Human-Computer Interaction*, *19*(4), 319–349. https://doi.org/10.1207/s15327051hci1904_2

Hassenzahl, M. (2010). *Experience design: Technology for all the right reasons*. Morgan & Claypool. https://doi.org/10.2200/S00261ED1V01Y201003HCI008

Kant, I. (2000). *Critique of the power of judgment* (P. Guyer, Ed. & Trans.). Cambridge University Press. (Original work published 1790)

Kim, Y., Choi, J., Park, Y.-J., & Yeon, J. (2016). The adoption of mobile payment services for "fintech". *Indian Journal of Science and Technology*, *11*(5), 1058–1061.

Lavie, T., & Tractinsky, N. (2004). Assessing dimensions of perceived visual aesthetics of websites. *International Journal of Human-Computer Studies*, *60*(3), 269–298. https://doi.org/10.1016/j.ijhcs.2003.09.002

Lidwell, W., Holden, K., & Butler, J. (2010). *Universal principles of design* (2nd ed.). Rockport Publishers.

Löwgren, J., & Stolterman, E. (2004). *Thoughtful interaction design: A design perspective on information technology*. MIT Press.

McCarthy, J., & Wright, P. (2004). *Technology as experience*. MIT Press.

Moshagen, M., & Thielsch, M. T. (2010). Facets of visual aesthetics. *International Journal of Human-Computer Studies*, *68*(10), 689–709. https://doi.org/10.1016/j.ijhcs.2010.05.006

Nasar, J. L. (1988). *Environmental aesthetics: Theory, research, and applications*. Cambridge University Press.

Nielsen, J. (1994). *Usability engineering*. Morgan Kaufmann.

Norman, D. A. (2004). *Emotional design: Why we love (or hate) everyday things*. Basic Books.

Norman, D. A. (2013). *The design of everyday things* (Revised and expanded ed.). Basic Books.

O'Brien, H. L., Cairns, P., & Hall, M. (2018). A practical approach to measuring user engagement with the refined user engagement scale (UES) and new UES short form. *International Journal of Human-Computer Studies*, *112*, 28–39. https://doi.org/10.1016/j.ijhcs.2018.01.004

O'Brien, H. L., & Toms, E. G. (2010). The development and evaluation of a survey to measure user engagement. *Journal of the American Society for Information Science and Technology*, *61*(1), 50–69. https://doi.org/10.1002/asi.21229

Plass, J. L., Heidig, S., Hayward, E. O., Homer, B. D., & Um, E. (2014). Emotional design in multimedia learning: Effects of shape and color on affect and learning. *Learning and Instruction*, *29*, 128–140. https://doi.org/10.1016/j.learninstruc.2013.02.006

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, *9*(5), 1–6. https://doi.org/10.1108/10748120110424816

Ruf, A., Zahn, C., Agotai, D., Iten, G., & Opwis, K. (2022). Aesthetic design of app interfaces and their impact on secondary students' interest and learning. *Computers and Education Open*, *3*, 100075. https://doi.org/10.1016/j.caeo.2022.100075

Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Free Press.

Shneiderman, B., & Plaisant, C. (2010). *Designing the user interface: Strategies for effective human-computer interaction*. Pearson.

Sillence, E., Briggs, P., Harris, P. R., & Fishwick, L. (2007). How do patients evaluate and make use of online health information? *Social Science & Medicine*, *64*(9), 1853–1862. https://doi.org/10.1016/j.socscimed.2007.01.012

Sonderegger, A., & Sauer, J. (2009). The influence of design aesthetics in usability testing: Effects on user performance and perceived usability. *Applied Ergonomics*, *41*(3), 403–410. https://doi.org/10.1016/j.apergo.2009.09.002

Tractinsky, N. (2004). Toward the study of aesthetics in information technology. In *Proceedings of the 25th International Conference on Information Systems* (pp. 771–780).

Tractinsky, N., Katz, A. S., & Ikar, D. (2000). What is beautiful is usable. *Interacting with Computers*, *13*(2), 127–145. https://doi.org/10.1016/S0953-5438(00)00031-X

Tuch, A. N., Presslaber, E. E., Stöcklin, M., Opwis, K., & Bargas-Avila, J. A. (2012). The role of visual complexity and prototypicality regarding first impression of websites: Working towards understanding aesthetic judgments. *International Journal of Human-Computer Studies*, *70*(11), 794–811. https://doi.org/10.1016/j.ijhcs.2012.06.003

Appendix A: Interface Screenshots

This study included the OER Commons™ (replicated in Figma) to demonstrate a basic functional design and color scheme, standard fonts, and minimal visual embellishments.
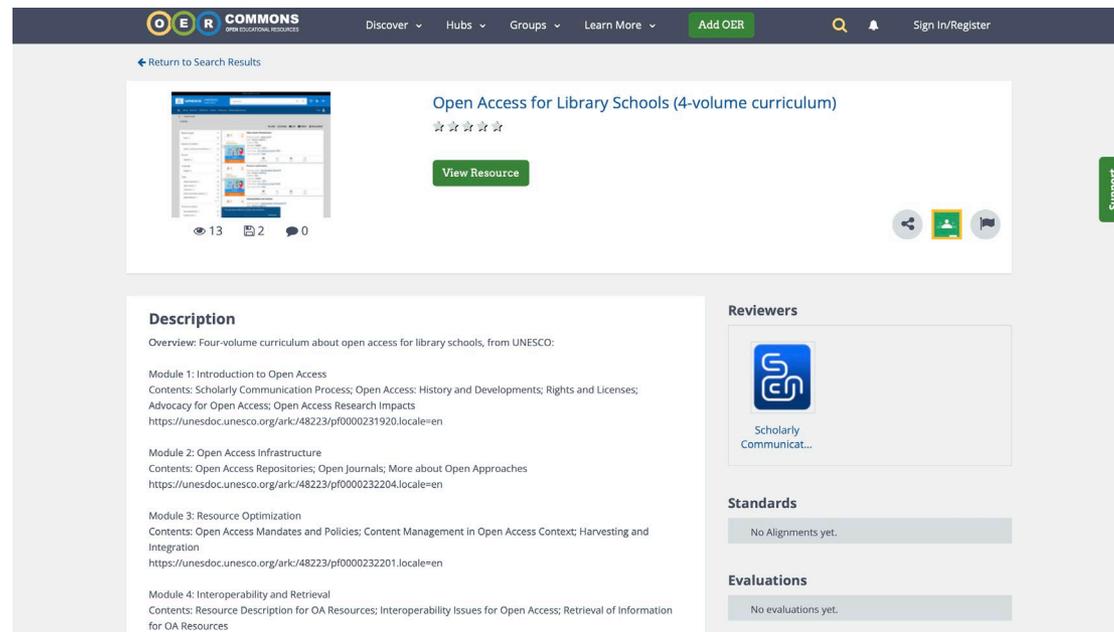

Figure 1: OER Commons: Functional Interface

The Moodle™ platform demonstrated a utilitarian layout, limited use of color, and an emphasis on clear functionality over aesthetic appeal.
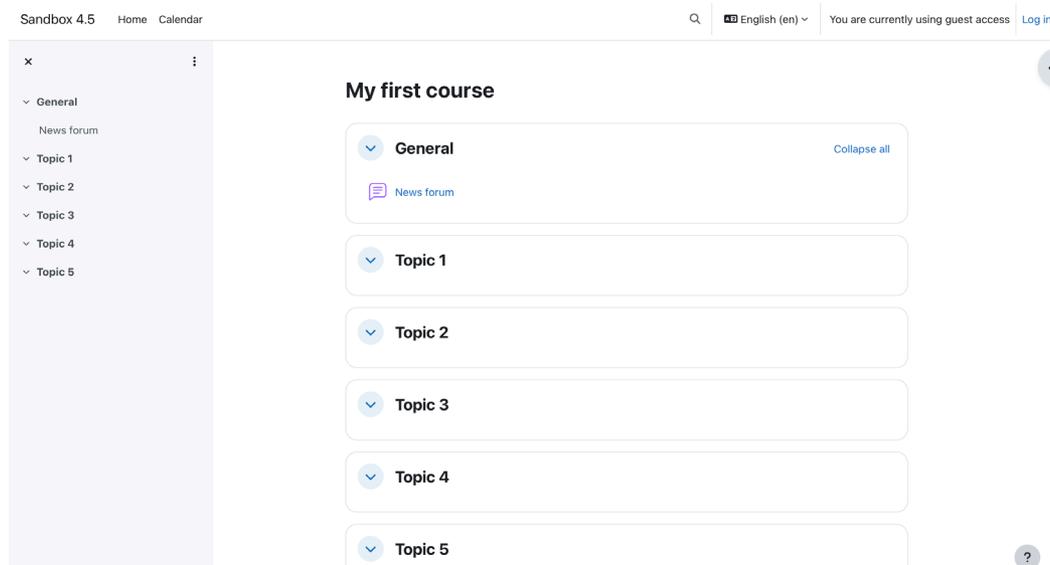

Figure 2: Moodle: Functional Interface

Khan Academy™ (created in Figma) illustrated a beautiful interface through the use of harmonious colors, engaging dynamic graphics, and visually inviting layout elements and typography.
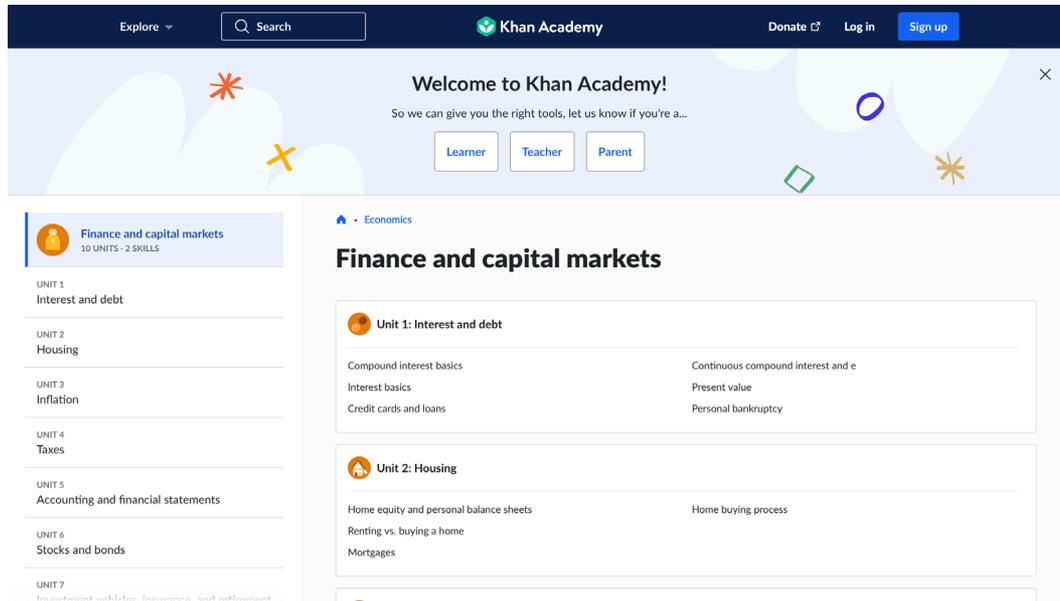

Figure 3: Khan Academy: Beautiful Interface

The Duolingo™ platform (created in Figma) featured vibrant colors, playful illustrations, and dynamic visual elements that exemplify a beautiful and engaging design. The abundant use of whitespace supported the modernistic design as well as decreased distraction while learning.
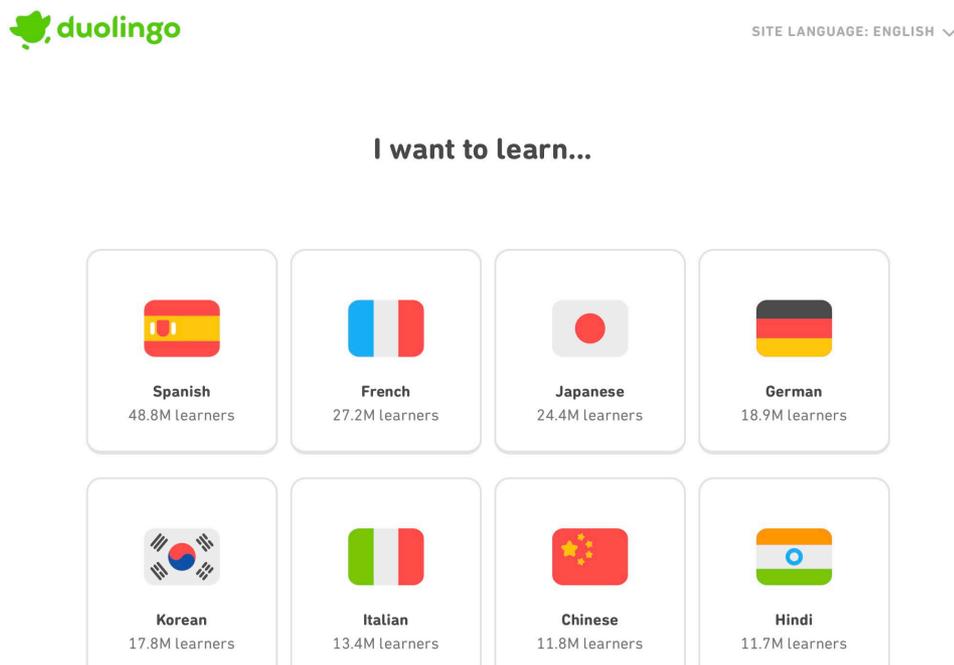

Figure 4: Duolingo: Beautiful Interface (courtesy of Duolingo)

Craigslist™ (created in Figma) represented a functional interface with a plain design, minimal color, and a straightforward text-based layout. Visual design quality was objectively poor.

The Glossier™ e-commerce site (created in Figma) highlighted a beautiful shopping interface with a refined and cohesive color palette, high-quality imagery, thoughtful typography, and a visually appealing, modernistic layout.

Appendix B

Qualitative Codebook

Code Name	Definition	Example Quotation
Visual Appeal	Positive comments about the attractiveness, color, or beauty of the interface	"Bright colors, soft gradients, and clear icons made it visually appealing to me."
Engagement	Expressions of feeling motivated, excited, or drawn in by the design	"I was excited to learn. The design drew me in instantly."
Trust/Professionalism	Comments linking beautiful or polished design to credibility, safety, or quality	"The site looked so good, I trusted it immediately."
Functionality	Emphasis on ease of use, clarity, or usability without mention of aesthetics	"It was okay to use but felt a bit dull and flat."
Blandness/Generic Design	Descriptions of the interface as boring, generic, or uninspiring	"It worked but was dull and uninspired. I probably wouldn't return. It's depressing."
Visual Features	Specific references to design elements (color, imagery, fonts, layout, animation)	"High-res images, smooth animations, and the coordinated color palette stood out to me."
Personal Value	Comments on how design made the content or experience feel important, worthwhile, or cared for	"Its attractiveness made the lesson feel valuable and showed attention to detail. It means more to me, I think."
Future Expectations	Hopes, expectations, or recommendations for future interface design	"I expect future platforms to be this visually impressive."
Satisfaction	Stated enjoyment or pleasure in using the interface	"Shopping was enjoyable and easy. I trusted the brand right away."
Desire for Creativity	Calls for more creative, inspiring, or visually engaging designs in the future	"Education sites should go beyond just working—they should inspire, and at least compete with the other options we have available to us."

Appendix C: Quantitative and Qualitative Measures

Quantitative Measures

Participants completed the following validated scales and items for each interface condition:

1. Visual Aesthetics of Websites Inventory (VisAWI) *(Moshagen & Thielsch, 2010)*

18 items, 7-point Likert scale (1 = Strongly disagree, 7 = Strongly agree), grouped into 4 subscales: Simplicity, Diversity, Colorfulness, and Craftsmanship

- The layout is simple.
- The color composition is attractive.
- The design is original.
- The site appears professionally designed.
- The color scheme is pleasant.
- The design looks creative.
- The design is harmonious.

2. User Engagement Scale – Short Form (UES-SF) *(O'Brien et al., 2018)*

12 items, 5-point Likert scale (1 = Strongly disagree, 5 = Strongly agree)

- I lost myself in this experience.
- I was deeply engaged in this activity.
- I felt involved in this experience.
- I felt interested in this experience.
- I felt frustrated while using this interface. *(reverse scored)*
- I felt drawn in by this experience.

3. Trust, Recommendation, and Return Intention

Single-item measures, 5-point Likert scale

- "I trust this website."
- "I would recommend this website to a friend."
- "I would return to this website in the future."

Qualitative Measures

After completing both interfaces within a given domain, participants responded to the following open-ended prompts:

1. Emotional and motivational responses: "How did this interface make you feel?"
2. Perceived meaning and value of beauty: "Did the beauty (or lack thereof) contribute to a sense of purpose, value, or care in your experience? Please explain."
3. Features noted as beautiful or not: "What features or aspects made this interface (or not) beautiful to you?"
4. Future expectations: "What are your expectations for beauty and design in future digital platforms in this context?"

About the Author

André Delwyn Gopal, BSc, MSc (UNIVERSITY OF KWAZULU-NATAL), BScHons (CS)
A lecturer at the University of the Witwatersrand, Gopal is interested in progress through art and technology, metaverse, meaningful narrative, penetration testing, cybersecurity, web development, and meaningful design.