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Summer and Beach Style Studio Developing a Scratch-Based Gamification Tool for Visualizing Seasonal Fashion

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Abstract: The rise of digital fashion has created a notable gap between online inspiration and practical style application, a challenge particularly prevalent in non-Western contexts like Indonesia, where generic digital tools often fail to meet local and cultural needs. This research addresses this gap by detailing the development and evaluation of "Summer and Beach Style Studio," a low-fidelity gamification tool built on the accessible Scratch platform. Adopting a qualitative approach guided by the ADDIE framework, this study collected data through semi-structured interviews with three experts: an industry creative director, a fashion practitioner, and an academic. The findings confirm a significant "Inspiration-Execution Gap" and validate the prototype as an effective solution. The tool was praised for its intuitive, game-like interface that successfully lowers technical barriers and encourages user experimentation. Experts also highlighted its strong pedagogical potential to enhance users' "visual literacy" and confidence. This study demonstrates that accessible, low-code platforms can be powerful, culturally relevant tools for fashion visualization and education, offering a potent alternative to complex, high-fidelity systems.

Keywords: Gamification, fashion visualization, scratch, accessible technology, fashion education, user experience

1. Introduction

The contemporary fashion design paradigm has fundamentally shifted towards digital integration, with traditional sketching and patternmaking methods being surpassed (Habib & Alam, 2023). Computer-Aided Design (CAD) software, 3D modeling, and virtual platforms are now extensively utilized by designers and fashion houses to accelerate the creative process, increase precision, and encourage more sustainable practices. Not only has the digital transformation revolutionized designers' workflows, but the way garments are interacted with and visualized by consumers before a purchase is also being changed, leading to increasing demand for more interactive and personalized visualization tools (Banerjee, 2018). Within this context, the development of accessible tools that leverage technology for fashion visualization purposes is being explored by our research (Kim et al., 2021).

A unique problem landscape is presented by this shift in Indonesia, a country geographically and culturally tied to its tropical climate and beach culture (Gama & Agustina, 2022). Summer and beach fashion styles ranging from resort casual wear to modest swimwear are considered an integral part of the local fashion market. Ways to experiment with clothing combinations that reflect personal style while respecting cultural norms and climatic conditions are actively being sought by consumers, who are heavily influenced by social media and global trends. However, the availability of affordable and accessible digital tools for these visual experiments is limited for general consumers, resulting in a barrier between inspiration and style actualization (Liu, 2025).Although technology integration in fashion has been recognized as a global phenomenon, significant gaps are shown in the focus of research and development across countries (Hoque et al., 2021). Literature from fashion hubs such as France and the United States often features advanced virtual try-on systems and AI-based personalization platforms, which are targeted at the luxury market.

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In contrast, innovations in digital production and supply chain optimization are typically addressed in studies from countries such as Germany and Turkey, which have strong textile manufacturing industries (Casciani et al., 2022). However, a noticeable gap can still be seen in studies concerning low-fidelity gamification tools that are educational and widely accessible, particularly those that are designed for non-Western cultural contexts (Khan, 2015). The potential of simple platforms to improve fashion literacy and support creative exploration among non-technical users has not yet been fully explored in recent scholarly work (Ko, 2023).

To meet the need for such an accessible tool, the Scratch programming environment is specifically utilized in this research (Yildiz et al., 2020). Originally developed by the MIT Media Lab, Scratch has been designed as a high-level, block-based visual programming language to simplify the creation of interactive stories, games, and animations (Abdalla, 2020). The platform was strategically chosen; significant technical barriers associated with traditional programming are removed by its intuitive drag-and-drop interface, making it ideal for the rapid prototyping of a gamification experience centered on visual aesthetics. Since Scratch is inherently educational, its use is aligned with the goal of this research to provide a tool that not only serves fashion visualization purposes but also functions pedagogically, so that digital creative expression can be engaged in by users with minimal technical expertise.

To fill this gap, a gamification tool titled *Summer and Beach Style Studio* is introduced in this article, which has been developed using the Scratch platform. The goal of this research is to explore how gamification can be utilized as a tool for fashion visualization, particularly in the context of accessible and culturally relevant digital design. Three main objectives are addressed. First, the development process of applying the game as a dynamic way to mix and match seasonal outfits is detailed. Second, the pedagogical and creative benefits provided to users by the game are identified. Third, the results of user interaction with the *Summer and Beach Style Studio* game are analyzed to evaluate its effectiveness as a fashion visualization tool.

2. Methodology

A qualitative approach was used in this research, guided by the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design framework to support the development and analysis of the *"Summer and Beach Style Studio"* gamification. This framework was selected due to its systematic and iterative nature, which allows formative evaluation to be conducted at each stage to ensure alignment of the final product with the research objectives. Primary data were collected through semi-structured interviews with expert participants, and thematic analysis was applied to analyze the data.

Semi-structured interviews were utilized as the main instrument for data collection. This approach was chosen to provide flexibility in obtaining in-depth insights from each participant, while still adhering to guiding questions aligned with the research objectives. Interviews were conducted at two critical stages within the ADDIE framework: during the Analysis stage to identify needs, and during the Evaluation stage to assess the final product. All interview sessions were audio-recorded with participants' consent and were transcribed verbatim for analysis.

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2.1. Analysis Stage

In this initial stage, a needs analysis was conducted to identify the core problem, development goals, and characteristics of the target users. A complete group of participants was interviewed to collect data on the challenges in fashion visualization, the gaps in existing tools, and the essential elements that should be included in the *"Summer and Beach Style Studio"*. The data analysis from this stage was used as the foundation for the design.

2.2. Design Stage

Based on the findings from the Analysis stage, detailed design specifications were formulated. User requirements were translated by the research team into user interface designs, user experience flows, and game mechanics.To visualize each screen and interaction within the Scratch application, storyboards and wireframes were created. This process included the design of visual assets such as the clothing items and backgrounds presented in Fig. 1.

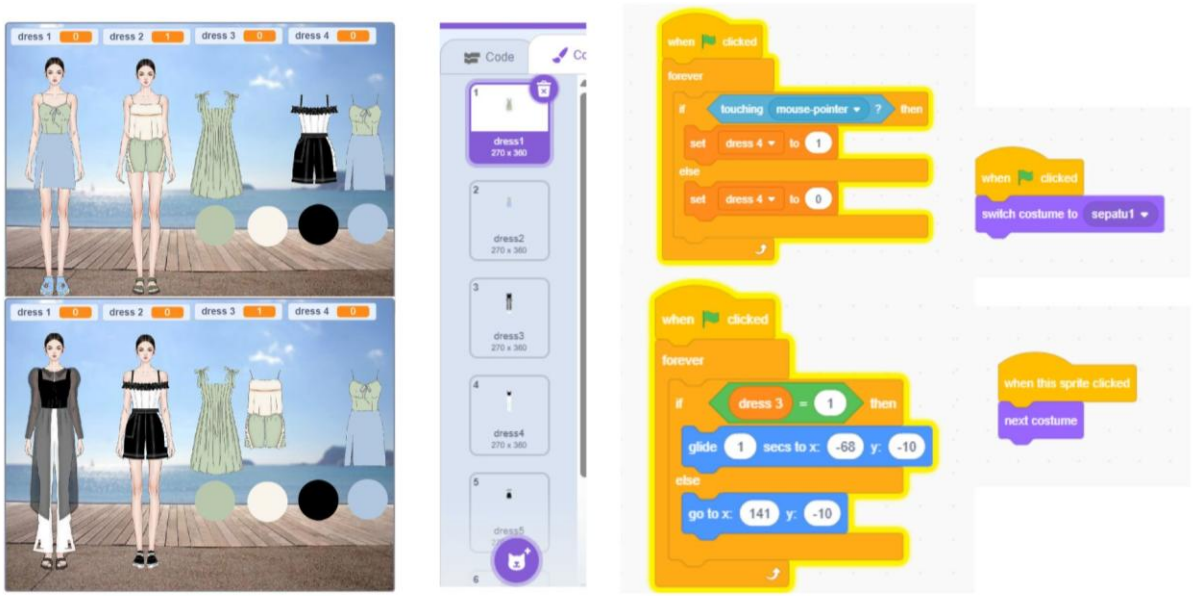


Fig. 1 Prototype design.

2.3. Development Stage

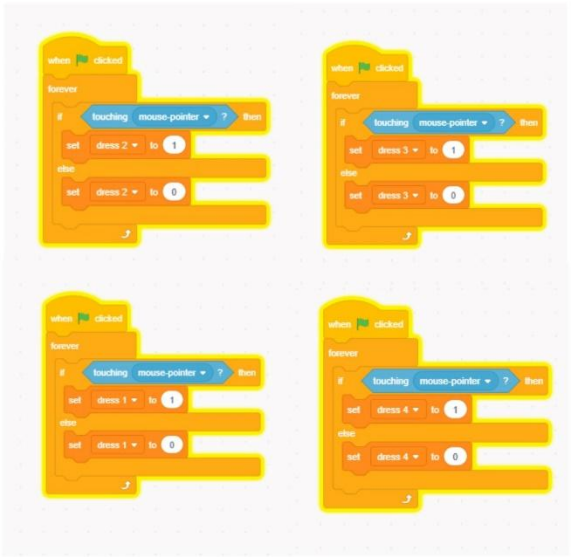
At this stage, the research team actively developed a functional prototype of "Summer and Beach Style Studio" using the Scratch platform. We created digital *sprites* for each clothing item and background according to the design document. Next, we devised block-based programming logic to implement *drag-and-drop* mechanisms, interface interactions, and other gamification features as shown in Fig. 2.

(a) (b) (c) (d)

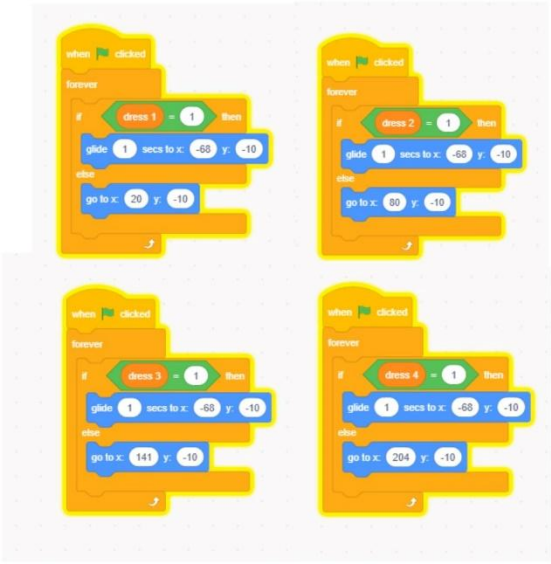
Fig. 2: (a) Mix-and-match interface displaying avatars and item counters; (b) Outfit selection using Dress 1 and Dress 2, showcasing a contrast between monochrome style and soft green tones; (c) Interface with Dress 3 selected, illustrating layered styling with sheer outerwear and casual wear; (d) Base outfit interface before item selection, showing default avatars and available fashion items.

At this stage, changes to the game mechanism result in changes to the coding that needs to be used so that this stage emphasizes the coding development process from the previous prototype to the finished product. Several parts of the game have been developed, as shown in Fig. 3.

(a)



(b)



(c)

Fig. 3: (a) The initial script activates costume and sprite visibility when the green flag is clicked and allows the user to switch outfits by clicking on the sprite. (b) The script checks if a specific dress variable equals 1 and glides the clothing item to a target avatar. If not, the item returns to its original position. This is used for Dresses 1–4 to manage their movement and placement. (c) The script continuously checks whether each dress sprite is touching the mouse pointer. If touched, the corresponding variable (e.g., dress1, dress2, etc.) is set to 1 to activate the clothing application. If not, it resets to 0.

2.4. Implementation Stage

The developed prototype was then implemented in a controlled trial session. The app was introduced and demonstrated to the same group of participants for their use and evaluation. During this session, their interaction with the app was observed and verbal feedback was recorded directly to capture authentic user reactions and experiences.

2.5. Evaluation Stage

The evaluation was both formative (ongoing at the end of each stage) and summative (at the end of the project). Summative evaluation was the main focus, where in-depth interviews were conducted with participants after they interacted with the prototype. The aim of this stage was to measure the effectiveness, usability, and benefits of the app based on the established research objectives.

The qualitative data from the interview transcripts was analyzed using the thematic analysis method (Lochmiller, 2021). This process was carried out through six sequential systematic phases. The first phase was data familiarization, where the transcripts were repeatedly read to understand the depth and breadth of the content. Next, initial coding was undertaken by systematically identifying and labeling segments of data relevant to the research questions. These collected codes were then grouped to search for and form potential themes. These themes were then reviewed and validated against the entire dataset to ensure coherence and accurate representation. After validation, the essence of each theme was defined and given a concise and informative name. As the final stage of analysis, a report was compiled that presents the findings

in the form of an analytical narrative, with the identified themes integrated and supported by direct quotes from participants as empirical evidence.

3. Results and Findings

In this section, the factual findings obtained from the thematic analysis of semi-structured interviews with three key respondents (R1, R2, and R3) are presented. The backgrounds and expertise of the experts who participated in this study are detailed in Table 1. As detailed in the table, the three female respondents each have over five years of experience in their respective fields. Respondent R1 is an Industry Expert, serving as a Creative Director at a local Indonesian fashion label with over 10 years of experience in brand development and local trends. Respondent R2 is a Practitioner, a freelance designer and stylist with over 7 years of experience in tropical and beachwear styling. Respondent R3 is an Academic, a lecturer in Fashion Design and Educational Technology with more than 8 years of experience in visual pedagogy and interactive design.

Table 1: Respondents' Background and Expertise

Respondent Code	Gender	Profession and Institution	Expertise and Experience (≥ 5 years)
R1	Female	Creative Director at a local fashion label, Indonesia	More than 10 years of experience in brand development and collection design. Expert in local trends, modest wear markets, and strategic fashion visuals.
R2	Female	Freelance Designer and Stylist, Surabaya	Over 7 years working in fashion styling for editorial and personal clients. Skilled in tropical and beachwear mix-and-match and practical style experimentation.
R3	Female	Lecturer in Fashion Design and Educational Technology, Surabaya	More than 8 years of experience teaching and researching visual pedagogy, interactive design, and fashion education media development.

3.1. Consensus on the "Inspiration-Execution Gap"

The analysis confirms a strong consensus among respondents regarding the gap between digital fashion inspiration and practical application. All three experts agreed that existing tools fail to address consumer needs adequately. From an industry perspective, R1 (Industry Expert) highlighted the core challenge, stating, "Indonesian consumers are flooded with inspiration from social media, but there is a big gap between seeing the perfect picture and applying it to yourself. They struggle to imagine if a certain color combination or silhouette will work." From a practitioner's viewpoint, R2 (Practitioner) pointed to a failure in localization, adding, "Existing apps are often global and don't capture the nuances of local styles or variations of modest wear that are popular here."

Meanwhile, R3 (Academic) provided a pedagogical lens, explaining how the prototype could bridge this divide: "By providing avatar templates and curated fashion options, it transforms the passive process of 'looking for inspiration' into an active process of 'trying on inspiration'." This observation aligns with research in the *International Journal of Fashion Design, Technology and Education*, which supports the importance of digital tools that facilitate active experimentation. The prototype directly addresses this need by providing a safe "virtual dressing room."

3.2. Positive Evaluation of Prototype's Accessibility and Intuitive Functionality

When interacting with the prototype, the respondents gave a highly positive response, focusing on its simplicity and gamified nature. R2 (Practitioner) emphasized the practical value of its usability: "It should be drag-and-drop. As intuitive as possible. Consumers don't want to learn complicated software just to match clothes." R1 (Industry Expert) echoed this sentiment when evaluating the gamification mechanism: "The drag-and-drop system and instant visual feedback make it feel like a game, not a job. It's interesting."

From a usability perspective, these comments underscore the prototype's success in creating an engaging user experience. This finding is consistent with research in the journal *Computers in Human Behavior*, which shows that perceived ease of use is a key predictor of technology acceptance. The prototype's intuitive design effectively removes intimidation and encourages experimentation.

3.3. Validation of Educational Potential and Future Development Directions

The interview data indicates that the experts rate the prototype's potential as an educational tool very highly. R3 (Academic) articulated its core benefit, stating, "The biggest benefit is visual literacy. Users unconsciously learn about proportions, color palettes, and visual balance as they play. It is experiential learning." R2 (Practitioner) supported this

by focusing on user confidence: "This tool can build confidence. Someone who is hesitant to try pastel colors might be bolder after seeing the combination work on an avatar." These findings are supported by literature in the field of HCI from *Springer Nature*, which highlights how effective visual interfaces can simplify the understanding of complex aesthetic concepts.

Despite the positive reception, the respondents also provided consistent, constructive suggestions for future development. A summary of the key questions asked during the interviews and a synthesis of the experts' views are presented in Table 2.

Table 2: Interview Questions and Respondents' Insights

No.	Interview Question	Respondents' Views	Initial Coding	Emerging Theme
1	What are the main challenges in visualizing summer and beachwear styles?	Social media inspiration is difficult to apply personally. Fear of making mistakes and limited imagination are common barriers.	Inspiration-reality gap, personal uncertainty, fear of experimenting	Gap Between Digital Inspiration and Personal Execution
2	Has current digital technology supported personal style exploration?	Apps are too global, lack local relevance. Tools are passive and don't encourage active exploration.	Irrelevant local content, lack of modest wear, passivity	Gap Between Digital Inspiration and Personal Execution
3	What visual/functional elements are most crucial in a fashion education tool?	Drag-and-drop is essential. Instant visual feedback is key to an intuitive experience.	Ease of use, instant feedback, intuitive design	Critical Role of Accessibility and Intuitive Functionality
4	Should local cultural factors be integrated into such a tool?	Very important. Coastal batik or hijab options will make it feel relevant.	Cultural context, product differentiation, modest wear representation	Potential for Local Cultural Integration and Development
5	How do you assess the prototype's potential as a fashion visualization tool?	Provides a safe space for experimentation. Helps turn abstract ideas into something tangible.	Safe experimentation space, concrete visualization	Gap Between Digital Inspiration and Personal Execution
6	Is the gamification mechanism intuitive and engaging?	Very intuitive and fun. Feels like a game, not a serious tool.	Intuitive mechanism, fun and engaging, removes intimidation	Critical Role of Accessibility and Intuitive Functionality
7	What are the educational benefits of the game?	Improves visual literacy and builds confidence to try new styles in real life.	Visual literacy, experiential learning, confidence building	Educational Benefits for Enhancing Fashion Visual Literacy
8	What suggestions do you have for future development?	Add more local content, save-look feature, and social media sharing.	Local content expansion, added features, interactivity	Potential for Local Cultural Integration and Development

4. Discussion

This study developing an accessible gamification tool, the "Summer and Beach Style Studio," and evaluating its effectiveness in bridging the "Inspiration-Execution Gap" within the Indonesian fashion context. The findings from the expert evaluations not only validate the initial premise that such a gap exists but also provide significant insights into how low-fidelity, user-friendly technology can serve as a powerful solution (Shahrasbi & Zheng, 2021). This discussion will interpret the study's key findings, connect them to the identified literature gap, and explore the broader implications for fashion education and industry, particularly in non-Western markets.

The consensus among the industry expert, practitioner, and academic (R1, R2, R3) provides strong evidence for the central problem: a disconnect between the global fashion inspiration consumed on social media and the ability of Indonesian consumers to apply it personally. The experts' critiques of existing digital tools as being too generic and failing to capture local nuances such as modest wear directly support the literature gap this study aimed to address (Liu, 2025; Hoque et al., 2021). The prototype was unanimously recognized as an effective "virtual dressing room" that empowers users by transforming the passive act of viewing into an active process of experimentation. This confirms that the prototype effectively meets the primary need for a safe, practical space to visualize fashion ideas.

Furthermore, this study's findings challenge the prevailing notion that meaningful digital fashion experiences require complex, high-fidelity technologies like AR or 3D modeling (Min et al., 2019). The enthusiastic response to the prototype's simple, Scratch-based "drag-and-drop" mechanism underscores the importance of accessibility and intuitive design. As articulated by the respondents, an interface that "feels like a game, not a job" is crucial for user engagement and removing intimidation. This aligns with established principles of technology acceptance, where perceived ease of use is a critical factor (as noted in *Computers in Human Behavior*). The strategic choice of a low-code platform like Scratch was thus validated as an effective method for rapid prototyping and creating engaging, educational tools without significant technical barriers, a point largely underexplored in the scholarly work mentioned by Khan (2015).

The educational potential of the "Summer and Beach Style Studio" emerged as a particularly strong theme. The experts highlighted its dual function as both a visualization tool and a pedagogical instrument that enhances "visual literacy" and builds user "confidence." By playing the game, users implicitly learn about proportion, color palettes, and balance, a form of experiential learning that can demystify fashion principles (Kalmpourtzis, 2018). This indicates that simple gamification can be a powerful and accessible medium for fashion education. The constructive suggestions for future development specifically the call for more local content like coastal batik, modest swimwear options, and social sharing features reinforce the prototype's success and relevance (Xiao, 2024). These suggestions confirm the critical need for cultural contextualization and point toward a clear path for future iterations that could foster community and co-creation

The implications of this research are threefold. For fashion educators, it presents a viable model for using low-code platforms to teach design concepts in an engaging manner. For independent designers and local brands in Indonesia, it demonstrates a low-cost strategy to create interactive marketing tools that resonate with their target audience. For technology developers, it highlights an underserved market for simple, culturally-aware apps that prioritize user empowerment over technical complexity.Despite the positive outcomes, the study has limitations, primarily the small sample size of three experts from one city (Surabaya), which limits the generalizability of the findings. Future research should involve a large-scale study with a diverse group of end-users to quantitatively assess the tool's impact on style confidence and purchasing decisions. The next development phase should focus on creating a more robust application that incorporates the suggested features, such as a wider library of local clothing items and social media integration, to fully realize the potential of this accessible and educational approach to fashion visualization.

5. Conclusion

This research successfully developed and validated the "Summer and Beach Style Studio," a Scratch-based gamification tool that effectively addresses the "Inspiration-Execution Gap" within the Indonesian fashion market. The study confirmed through expert analysis that the failure of generic, global digital tools creates a distinct need for culturally aware solutions that cater to local styles, such as modest wear. The prototype's success was overwhelmingly attributed to its accessibility and intuitive, game-like interface, which empowered users to experiment with fashion combinations without the intimidation of complex software.Beyond its primary function as a visualization aid, the tool demonstrated significant value as a pedagogical instrument capable of enhancing users' "visual literacy" and building their creative confidence through experiential play. The main contribution of this study is its demonstration that accessible, low-code platforms can be highly effective for fashion visualization, challenging the paradigm that such tasks require high-fidelity, resource-intensive technology. While the findings are based on a small expert sample, this research validates a powerful and low-cost model with strong implications for fashion educators and local brands. Future work should focus on expanding the tool's features and local content based on larger-scale user studies.

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Conflict of Interest

The authors declare no conflicts of interest.

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