



Ginko and Swan Style Transformation: Designing an Interactive Dress-Up Game with Scratch

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Abstract: Contemporary fashion design is undergoing a significant shift towards interactive digital ecosystems, yet there is a gap in accessible educational platforms for translating abstract style concepts into practice. This research aims to design, develop, and evaluate an interactive dress-up game, "Ginko and Swan Style Transformation," using the Scratch visual programming platform as a pedagogical solution. Adopting the ADDIE instructional design methodology, this research uses a qualitative approach through semi-structured interviews with nine participants consisting of industry experts, practitioners, and fashion academics. Data was analyzed using Thematic Analysis. The results identified three main themes: (1) The narrative duality of the organic "Ginko" style and the structured "Swan" style. The existence of a pedagogical gap in conventional tools; and (3) The validation of the game prototype as an effective medium for design exploration by experts. This study demonstrates that low-barrier platforms like Scratch can successfully bridge design theory and practice, offering a potential gamification model to enhance engagement and conceptual understanding in fashion education.

Keywords: ADDIE, scratch, ginko and swan, lecturer

1. Introduction

The contemporary fashion design paradigm shows a significant shift from purely physical artifacts towards interactive digital ecosystems (Bertola & Teunissen, 2018). The convergence of fashion and technology has given rise to a new domain where gamification, virtual try-on, and digital prototypes are no longer futuristic concepts but strategic tools for innovation, expression, and consumer engagement (Chen, 2020). Digital platforms allow designers to iterate on ideas with unprecedented speed, democratizing the creative process and expanding fashion narratives beyond material limitations (Gallery, 2025). In this context, clothing functions not only as a body covering but also as a dynamic entity that can be manipulated and experienced in a virtual space (Machidon et al., 2018).

The research problem investigated in this paper is the challenge within the process of the Ginko and Swan Style Transformation through the Design of an Interactive Dress-Up Game with Scratch. This challenge is twofold. First, there is the difficulty of translating abstract and narrative style concepts in this case, the "Ginko Style" which symbolizes natural elegance and the "Swan Style" which represents classic beauty into a structured digital medium. Second, conventional pedagogy and design prototype methods, such as two-dimensional sketches or physical samples, often fail to capture the interactive and transformative essence of a fashion idea, while also limiting the scope for exploration due to cost and production time (Roberts, 2024). This research argues that a dress-up game offers a solution to represent fashion logic and narratives dynamically.

The research gap becomes clear when comparing this condition with international scholarly discourse. Researchers in France and the United States lead in the exploration of photorealistic simulations and commercial virtual try-on platforms targeting the high-end retail industry. Meanwhile, discourse in Germany and Turkey tends to focus on the integration of digital design with supply chain optimization and smart manufacturing. Research in Russia, on the other hand, often explores the algorithmic and generative aspects of creating digital textile patterns. Despite this significant progress, a clear gap exists: the lack of accessible, education-oriented platforms that allow novice designers and students

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to explore fashion style narratives and logic interactively without requiring expensive hardware or software. This research argues that a visual programming application like Scratch offers an untapped solution to bridge this gap, focusing on the design conceptualization process rather than just the final visualization.

The selection of the Scratch application as the development platform in this research is a strategic methodological decision. Scratch, developed by the MIT Media Lab, provides a block-based visual programming environment that fundamentally lowers the technical threshold for its users (Alrubaye, 2017). This drag-and-drop paradigm allows the researcher to focus energy on the conceptual logic and visual narrative of the "Ginko Style" and "Swan Style," rather than on the syntactic complexities of traditional coding. Furthermore, Scratch inherently supports the creation of visual assets and conditional logic that are at the core of a dress-up game. This research utilizes these features to translate every design element such as vest silhouettes, color palettes, and signature accessories into individual objects (sprites) within the game. Each sprite is then given a set of rules or scripts that govern how it interacts with user input and with other sprites. This mechanism allows for the simulation of "adding" and "removing" clothes digitally. This flexibility proved crucial in representing style transformation, where simple programming logic can manage complex costume changes and even trigger background or sound effect changes to reinforce the displayed aesthetic narrative.

Therefore, Scratch in the context of this research functions not only as a development tool but also as a conceptual medium. This platform provides a "digital laboratory" where abstract fashion concepts can be tested and realized in the form of concrete, interactive artifacts. Its ability to unite visual art, narrative, and programming logic in a single, integrated environment makes it an ideal instrument for bridging the gap between fashion design ideas and their practical and educational digital implementation.

2. Methodology

This research adopts the ADDIE instructional design framework an acronym for Analysis, Design, Development, Implementation, and Evaluation (Patel et al., 2018). This validation from the experts confirms the successful application of gamification principles the use of game elements in non-game contexts to increase engagement. This model was chosen for its systematic, structured, and iterative nature, making it highly relevant for guiding the creation and validation of an educational product like an interactive game based on Scratch. Each stage in the ADDIE model logically builds the foundation for the next, ensuring that the final developed product truly answers the identified needs. A qualitative approach forms the backbone of this research, with in-depth interviews as the primary instrument for data collection.

2.1 Analysis Phase

In this initial stage, the research conducts a comprehensive needs identification and problem analysis. The main focus is to deconstruct the abstract concepts of "Ginko Style" and "Swan Style" into measurable elements that can be translated into digital assets. The research also analyzes the challenges faced by design students in understanding and exploring fashion narratives through conventional methods. Primary data collection in this phase is carried out through semi-structured interviews with experts to gain a deep understanding of the essence of both styles and the pedagogical needs in design education. The result of this stage is a clear set of learning objectives and functional requirements specifications for the game to be designed.

2.2 Design Phase

Based on the findings from the analysis stage, the design stage focuses on creating a blueprint for the "Ginko and Swan Style Transformation" game prototype as shown in Figure 1. This process includes designing the storyboard, user interface (UI), user experience (UX), and determining the game mechanics. The research team translates insights from the experts into concrete visual and interactive elements. Design decisions, such as the selection of color palettes, clothing silhouette shapes, and types of accessories, directly refer to the qualitative data that has been collected. The output of this phase is a detailed design document that serves as a guide for the development stage.

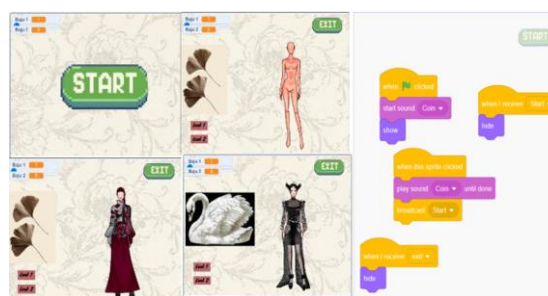


Figure 1: Prototype design

2.3 Development Phase

In this stage, the research team technically builds the digital artifact based on the blueprint from the design stage. Using the Scratch visual programming platform, all the designed visual assets (sprite objects) are imported and animated as shown in Figure 2. The researchers write block-based code scripts to implement the game's logic, including drag-and-drop functionality for clothes, style transition systems, and other interactive elements. The development process is carried out iteratively, where periodic internal testing ensures that the technical functionality runs according to the design specifications. The final result of this stage is a functional prototype of the dress-up game.

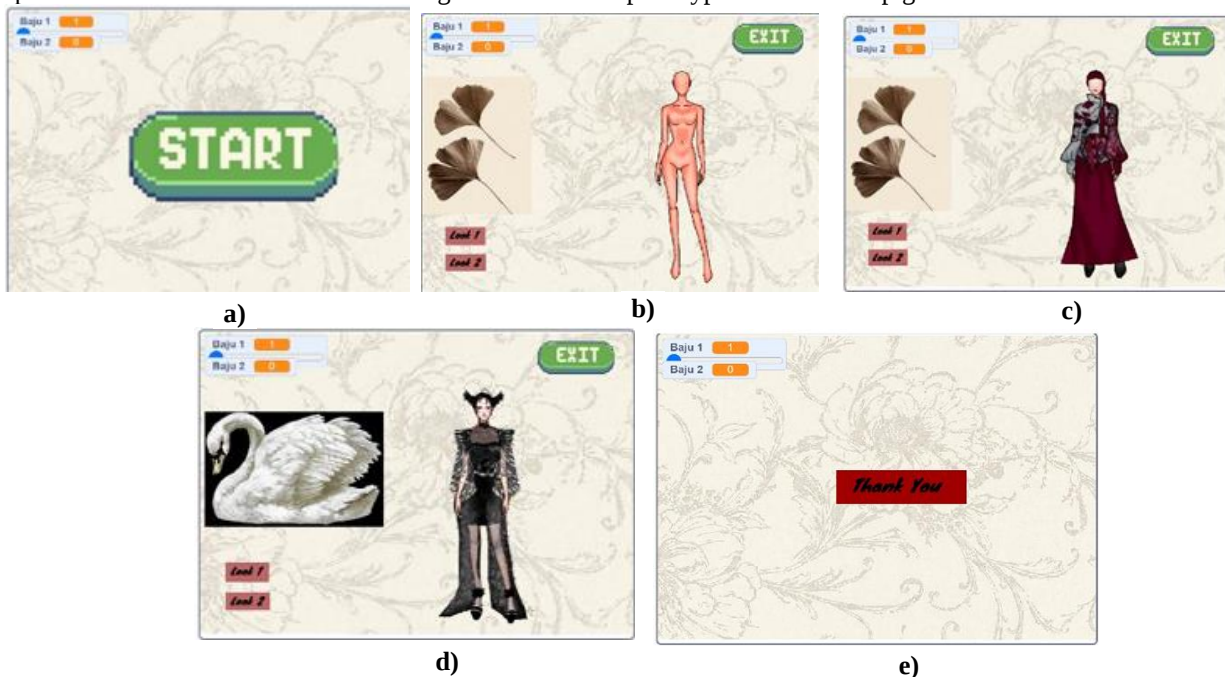


Figure 2: a) Main menu Interface, b) Simple Circuit Interface, c) Simple Circuit Interface, d) Simple Circuit Interface, e) Simple Ending interface

In this study, the outcomes of the discussions held during the design phase guided the creation of the software and instructional materials for the digital game. A scratch was used to code the digital game and create an application, in accordance with the present study's development strategy. Every development was put through constant testing to ensure that the electrical digital game ran smoothly and effectively. Like this Figure 4

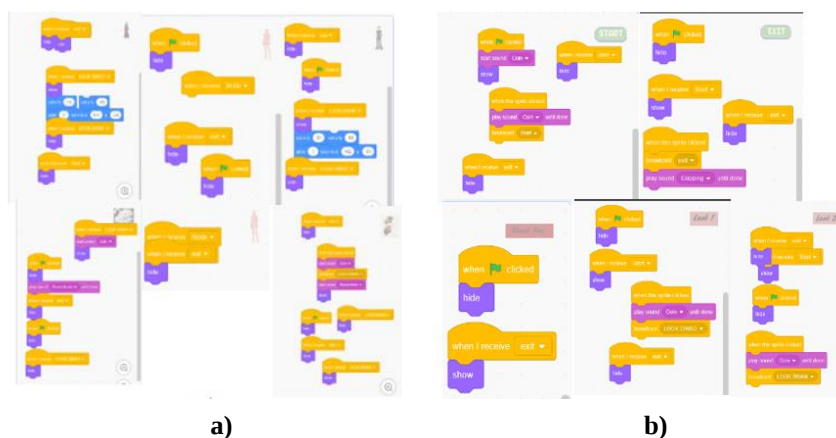


Figure 3: a) Coding for Elements Looks b) coding for switch interactive objects

2.4 Implementation Phase

The implementation stage involves introducing the game prototype to a group of participants. In the context of this research, the initial implementation was conducted in guided testing sessions with some of the same experts involved in the analysis stage. The goal is to demonstrate how their abstract concepts have been realized in an interactive medium.

During these sessions, researchers observe the participants' interactions with the game and collect initial feedback on the clarity, usability, and appeal of the prototype.

2.5 Evaluation Phase

Evaluation is the final stage, which aims to measure the effectiveness of the game in achieving the objectives set at the beginning. This research uses formative evaluation (feedback collected during the implementation stage for improvement) and summative evaluation. Summative evaluation is conducted through a second in-depth interview session with the experts after they have interacted with the prototype. This evaluation focuses on content validation (does the game accurately represent both styles?), pedagogical validation (does the game have potential as a learning tool?), and conceptual validation (is the game a successful medium for design exploration?)

To achieve the research objectives, data collection and analysis conducted through a meticulous qualitative approach. This research purposively involved nine participants, who were grouped into three essential categories to ensure data triangulation from various perspectives: three experts from the fashion industry, three practitioners who are active fashion designers, and three academics from related fields. The primary instrument used to gather data from the participants was the semi-structured interview, which was designed to be open-ended in order to capture rich and in-depth insights. The interview guide was applied in two crucial phases: first, in the analysis phase to explore fundamental concepts, and second, in the evaluation phase to obtain in-depth feedback on the developed prototype. All qualitative data collected from the interview transcripts were then analyzed using the Thematic Analysis method, based on the systematic framework of Braun & Clark (2006). This analysis process included six stages, ranging from data familiarization, initial code generation, searching for themes, reviewing and refining themes, and final definition, to the production of an analytical report to identify patterns and key insights relevant to the research questions.

3. Findings

This section presents and discusses the main findings that emerged from the thematic analysis of interview data with 9 participants (industry experts, practitioners, and fashion academics). The analysis was guided by the framework of questions for the analysis and evaluation stages. Three central themes were successfully identified: (1) The Duality of Style Narratives: Organic "Ginko" versus Elegant "Swan" Structure; The Pedagogical Gap in Conceptual Design Exploration; and (3) The Conceptual Validation of Gamification as a Design Exploration Medium.

3.1 Theme 1: The Duality of Style Narratives: Organic "Ginko" versus Elegant "Swan" Structure

In response to the first and second questions in the analysis stage, the thematic analysis revealed a strong consensus among the experts in conceptualizing the "Ginko Style" and "Swan Style" as opposing narrative systems. Participants consistently described the essence of the "Ginko Style" using phrases like organic, asymmetrical, deconstruction, natural flow, and poetic imperfection. When asked to visualize it, the elements that emerged were loose and unstructured silhouettes, earth-tone color palettes, and raw or natural textures. Conversely, the essence of the "Swan Style" was universally linked to keywords like structure, symmetry, classic elegance, clean lines, and controlled grandeur. Its visualization included well-defined silhouettes, monochromatic palettes (white, black, silver), and smooth, luxurious textures.

This finding underscores that fashion operates as a complex visual language, where each design element communicates deep meaning (Mamis et al., 2023). This is consistent with the framework of fashion semiotics, which views clothing as a "text" laden with cultural and aesthetic signifiers (Lorusso (2015)). The philosophical distinction made by the experts between "Ginko" (nature, freedom) and "Swan" (culture, control) shows that the developed game prototype is essentially a platform for manipulating these systems of meaning. Furthermore, this duality can be analyzed from a neuroaesthetics perspective. Research shows that the human brain processes organic and curved contours differently from geometric and symmetrical shapes, with the former often associated with naturalness and the latter with safety and man-made precision (Geratowski, 2020). Thus, the game effectively facilitates exploration into two fundamental poles of aesthetic perception.

3.2 Theme 2: The Pedagogical Gap in Conceptual Design Exploration

In response to the third question in the analysis stage regarding teaching challenges, the participants, especially from academia, collectively identified a significant gap in conventional pedagogical tools. The biggest challenge expressed was the difficulty in teaching students to move from two-dimensional thinking (sketching) to three-dimensional conceptual and structural understanding. One academic stated, "Students can draw beautiful pictures, but they struggle to understand the logic and narrative that unifies a collection. A sketch is static." This limitation, exacerbated by the cost and time of creating physical prototypes, was considered to hinder students' ability to experiment and iterate on designs quickly and reflectively.

This finding reflects the ongoing debate in design education literature about the urgency of adopting more dynamic digital tools. Mitra (2019) from Taylor and Francis, for example, found that the integration of 3D virtual prototyping significantly improves students' spatial understanding beyond what traditional methods can offer. The gap identified by

the experts can also be framed using the classic Nguyen et al. (2020), which argues that effective professional learning occurs through rapid "reflection-in-action" cycles. Conventional mediums often slow this cycle, whereas an interactive medium like the developed game can potentially condense it, allowing for crucial instant reflection. The game, therefore, functions as a safe virtual "practicum" for experimentation.

3.3 Theme 3: Conceptual Validation of Gamification as a Design Exploration Medium

In the evaluation stage, the experts' responses to the game prototype re very positive and pointed towards concept validation. Ansring the first evaluation question, a majority of participants (seven out of nine) felt the game successfully captured and represented the essence of the "Ginko" and "Swan" styles effectively, albeit in a simplified form. The clear user interface with ginkgo and swan icons was considered very helpful in building thematic associations. Regarding its potential as a learning tool, all participants rated the game as having high to very high potential. They highlighted its ability to make abstract concepts "visible and playable."

The most effective feature was judged to be the instant visual feedback loop, where users can immediately see the results of each clothing choice. Conversely, the most frequently mentioned areas for improvement re the addition of more asset variety (clothing and accessories) and a feature to save creations. Finally, ansring the question about professional potential, eight of nine participants saw potential for using this tool as an initial conceptual prototyping medium. One industry expert stated, "This isn't for making technical patterns, but it's an amazing tool for the brainstorming stage and for creating an interactive mood board. It's fast, cheap, and effective for communicating an initial idea."

This validation from the experts confirms the successful application of gamification principles the use of game elements in non-game contexts to increase by (Treiblmaier, 2018). By framing the design task as a "game," this prototype successfully created a motivating learning experience, consistent with practices outlined by Gandolfi (2018) in an MDPI journal. Moreover, the game functions as an effective Creativity Support Tool, a concept supported Behnamnia et al. (2020) in an Emerald publication. By providing a platform for risk-free exploration and rapid visualization, this tool empors novice designers to experiment, thereby bridging the gap beten design theory and enjoyable creative practice

Table 1: Expert background and expertise.

Main ThemeKey Question (Interview Stage)	Main ThemeKey Question (Interview Stage)	Main ThemeKey Question (Interview Stage)	Main ThemeKey Question (Interview Stage)
1. Duality of Style Narratives	Describe the essence of the styles inspired by "Ginko" and "Swan". (Analysis Stage)	Respondents consistently differentiated "Ginko" as an organic, asymmetrical, and deconstructive style, while "Swan" was considered structured, symmetrical, representative of classic elegance. an	Senior Lecturer (18 yrs) & Creative Director (20 yrs)
2. Pedagogical Gap	What is the biggest challenge in explaining narrative or abstract style concepts to design students? (Analysis Stage)	The main challenge is the students' difficulty in transitioning from 2D sketches to understanding 3D logic. Expensive and slow physical prototyping was also noted to hinder the courage to experiment.	Head of Fashion Design Program (15 yrs)
3. Conceptual Validation	How do you assess the potential of this game as a learning tool and as a conceptual prototyping medium in the professional design process? (Evaluation Stage)	Assessed as having high potential as a learning tool due to its instant visual feedback. For professionals, it is highly effective as a brainstorming tool and an interactive mood board in the initial ideation stage.	Media Technology Lecturer (12 yrs) & Venture Capitalist (14 yrs)

4. Conclusion

This research successfully demonstrates that an accessible visual programming application like Scratch can be an effective medium for translating complex fashion narratives into interactive digital artifacts. Through the development

of the "Ginko and Swan Style Transformation" game prototype, this study provides empirical evidence for three main conclusions. First, the limitation of conventional pedagogical methods in facilitating rapid and reflective design experiments is real and acknowledged by experts in the field. Second, the developed game prototype was validated by experts as a highly potential learning tool, especially due to its ability to provide instant visual feedback and make abstract concepts more concrete. Third, the game proved to be an effective tool for conceptual prototyping for the ideation or brainstorming stage. Nevertheless, this study has limitations, including the limited number of participants (nine people) and the focus on a single development platform. Therefore, future research is recommended to test this prototype on a larger scale involving design students directly, as well as to explore the development of more complex features based on expert feedback.

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Conflict of Interest

the authors declare no conflict of interest

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