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Girls Day in The Digital World: Developing Creativity Through Dress Up Games in The Scratch App

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Abstract: The paradigm shift in contemporary fashion design toward the digital realm represents a fundamental revolution, opening unique opportunities for children to interact innovatively with mode. However, the explicit integration of fashion design with children's creativity through digital platforms is often suboptimal. This research aims to fill this gap by developing a Scratch-based dress-up game prototype titled "Girls Day" as a tool to stimulate creativity, simultaneously identifying the key game elements effective in encouraging creativity and analyzing their potential impact on children's expressive abilities. The ADDIE methodology (Analysis, Design, Development, Implementation, Evaluation) is adopted as a systematic and iterative framework for the game's development and evaluation, effectively integrating artistic aspects with technological skills. As an anticipated main finding, the game is expected to facilitate active and constructive learning, with interactive features that significantly enhance children's creative expression and visual literacy in fashion design. It is concluded that this Scratch-based game prototype is effective as an empowering digital educational tool, successfully integrating fashion design concepts with basic computational skills. It is recommended that digital products of this kind be integrated into project-based learning curricula and that further research be conducted on their long-term effectiveness.

Keywords: Digital fashion design, dress-up games, scratch, children's creativity, digital literacy

1. Introduction

The contemporary fashion design paradigm now demonstrates a fundamental shift, transcending the boundaries of physical materials to integrate significantly into the digital realm, thereby becoming a dynamic and innovative medium for creative expression. This transformation is not merely an adaptation to technological advances, but a revolution that profoundly redefines how fashion designers create, how consumers interact with fashion, and the operations of the entire industry (Estede et al., 2025). The rapid development of information and communication technology not only revolutionizes the processes of fashion production and consumption but also opens new imaginative spaces for aesthetic exploration unconstrained by the physical limitations of the real world (Crewe, 2013). This phenomenon essentially creates a unique opportunity for individuals of all ages, including children, to interact with fashion design concepts in an innovative way through virtual platforms. This fundamental shift imperatively demands a new approach to understanding and facilitating the development of creativity, particularly within the increasingly pressing context of digital literacy in the modern era (Schwab, 2019).

Although fashion trends and style exploration continue to evolve rapidly within the digital ecosystem, the explicit integration between fashion design and the development of children's creativity through digital platforms is often suboptimal. While various digital applications and games do offer fashion-related experiences, many of them focus on passive consumption or limited interaction, failing to empower users to truly design and program their own fashion elements (Utoyo, 2020).

The Scratch application, as an intuitive and easily accessible visual programming environment, has consistently proven effective in introducing computational concepts to children (Maharani et al., 2023). Through its simple and

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interactive graphical block-based interface, Scratch enables users of various ages to design interactive stories, animations, and complex games without requiring a deep understanding of traditional code syntax (Ummi, 2024).

In this context, developing a dress-up game using Scratch not only offers entertainment but also facilitates active and constructive learning through practical exploration. This aligns with the global scientific discourse, particularly from developed countries, which consistently shows an increasing focus on gender-inclusive STEM (Science, Technology, Engineering, and Mathematics) education and the development of early childhood digital literacy (Raharjo, 2023). Thus, the Scratch dress-up game project uniquely offers a platform that integrates artistic aspects with technological skills, providing an inclusive and empowering learning environment.

This research seeks to fill this gap by focusing on the development and analysis of a Scratch-based dress-up game as a tool for stimulating creativity. Three main objectives are interconnected in this investigation. First, this research develops a model and prototype of a dress-up game using the Scratch application. The game design specifically facilitates the exploration of fashion design, emphasizing an intuitive interface design and fashion elements that can be creatively customized by users. This approach allows users to combine various pieces and accessories to create their unique designs. Second, this research identifies the key elements in the design of a Scratch-based dress-up game that effectively promotes creativity and aesthetic understanding in children. This involves an in-depth analysis of interactive features, such as drag-and-drop functionality and dynamic color changes. The study also examines the variety of fashion choices and customization mechanisms that inherently stimulate children's imagination and design experimentation. Third, this research analyzes the potential outcomes and impact of the developed dress-up game on the stimulation of design-related cognitive abilities such as creativity, problem-solving, and divergent thinking in the context of fashion design. This potential evaluation is conducted through systematic observation, including trials with eleven (11) children to analyze the creation process and the resulting final design products.

2. Methodology

This research adopts the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) as its systematic and iterative methodological framework. This framework is used to develop and evaluate the "Girls Day" dress-up game within the Scratch application. This comprehensive approach allows researchers to design, build, and analyze the effectiveness of an educational digital product in a structured manner, ensuring each step contributes significantly to achieving the research objectives.

2.1 Analysis Phase

The researchers commenced by identifying the specific needs, demographic characteristics, and cognitive profiles of the primary target users, namely girls in the context of 'Girls Day.' This process involved the in-depth collection of information regarding contemporary fashion design trends relevant to the children's segment, including aesthetic elements and style preferences. The researchers also analyzed the psychological and cognitive characteristics of the target age group of girls (7-12 years), covering attention span, visual preferences, level of abstract concept comprehension, and learning styles. Furthermore, this stage included a comprehensive evaluation of the potential and technical limitations of the Scratch application as a platform for educational game development. The analysis also encompassed a comparative study of existing dress-up games in the market or on other educational platforms, in order to critically identify features that have successfully triggered creativity and areas that still require further development or innovation. The researchers precisely utilized the results of this analysis to formulate the functional and non-functional requirements of the game to be developed.

2.2 Design Phase

The researcher actively translated the analysis results into a conceptual blueprint for the game. This process systematically involved designing the overall game architecture, including an intuitive navigation structure, a visually appealing user interface (UI), and an immersive and satisfying user experience (UX). The researcher created detailed visual storyboards illustrating the gameplay flow, developed game flow schemes to logically map user interactions, and built initial prototypes to visualize key game design elements. The researcher specifically defined the features of the "Girls Day" dress-up game that would facilitate creative exploration, such as a wide variety of fashion style options, a rich palette of color combinations, and a diverse collection of accessories, all designed to enable free and limitless artistic expression.

Figure 1: Prototype design

2.3 Development Phase

The Development Phase is the implementation stage in which the conceptual design is transformed into a functional game using the Scratch application. During this phase, the researchers carefully developed each sprite (interactive characters and visual objects), background scenes, and block-based programming scripts required to create an interactive dress-up experience. The development process began with the creation of the game's main menu page, as shown in Figure (a), followed by the development of nine character design pages, as shown in Figures (b)–(j). Each page presents various clothing options that players can select and apply to the character. Navigation between design pages is facilitated through the Next button, allowing players to explore and experiment with different outfit combinations.

In addition to developing the game interface, the researchers also created Scratch-based programming scripts to manage the game's functionality and interactions. Figure (k) illustrates the Start button script, which initiates the game from the main menu. Figure (l) shows the page display control script utilizing the show, hide, and broadcast functions to manage page transitions. Figure (m) presents the outfit selection script that enables the character's appearance to change according to the player's choices. Meanwhile, Figure (n) illustrates the Next button script, which allows players to navigate to subsequent design pages. Throughout the development process, continuous functional testing was conducted on individual components to ensure that buttons operated correctly, clothing items were accurately attached to the character, and page navigation functioned as intended. Integration testing was also performed to verify that all game elements interacted seamlessly and that costume changes consistently affected related components without generating errors or bugs. This phase emphasized iterative development and continuous refinement to ensure that the game functioned exactly as intended in the original design.

(a) Main Menu

(b) Design 1

(c) Design 2

(d) Design 3

(e) Design 4

(f) Design 5

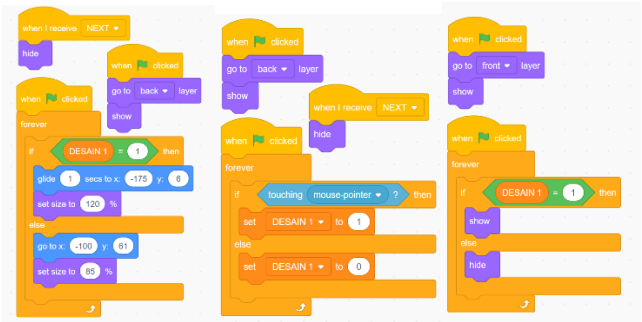
(g) Design 6

(h) Design 7

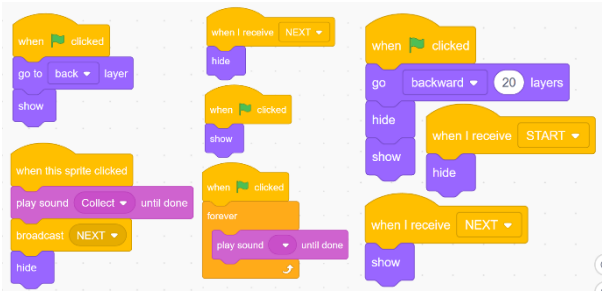
(i) Design 8

(j) Design 9

(k) Start button



(l) Page display control *(m) Character outfit selection*



(n) Next button script

Figure 2: (a) Main menu; (b) design 1; (c) design 2; (d) design 3; (e) design 4; (f) design 5; (g) design 6; (h) design 7; (i) design 8; (j) design 9: (k) start button; (l) page display control; (m) character outfit selection; (n) next button script

2.4 Implementation Phase

This stage involved the testing of the developed "Girls Day" game with a representative target group. The researchers directly observed user interaction with the game, meticulously noting how the children responded to the interface, the extent to which they utilized the customization features, and the unique expressions of creativity they demonstrated through fashion combinations. During this phase, the researchers also proactively gathered initial feedback from users regarding the ease of use, the visual and interactive appeal of the game, and the perceived potential for creativity enhancement. Fundamentally, this stage allowed the researchers to make minor refinements and initial adjustments based on the observations and feedback obtained directly from the field, prior to further evaluation.

2.5 Evaluation Phase

The Evaluation Phase is an ongoing process that occurs throughout the entire ADDIE cycle, culminating in both formative and summative evaluations. The researcher collects qualitative data to assess the game's effectiveness in achieving the research objectives.

3. Findings and Discussion

This section presents the main findings from the research on developing the "Girls Day" dress-up game in the Scratch application, followed by an in-depth discussion linking these findings to scientific literature and their implications.

3.1 Findings

The success of this prototype confirms the significant potential of digital platforms as facilitators of fashion design creativity in young girls (Wibowo, M. C. 2025). This development phase began with a needs analysis that identified the urgency of an intuitive platform for children to express their design ideas. The provision of a diverse fashion asset library, ranging from tops to bottoms across various styles, directly addresses the trend of mass personalization, where modern consumers including children desire to interact and become co-creators in their experiences.

The design is reinforced by theoretical support and practical findings. Experts confirmed that the variation of choices and the ability to manipulate elements (such as changing colors) are powerful stimulators of creativity. Moreover, the instant visual feedback, where the child immediately sees the results of her creation, functions as an essential intrinsic motivator, as emphasized in research on the effectiveness of formative feedback in learning (Jaya & Dirawan, 2016). The inclusion of a narrative element, such as the context of "Girls Day party preparation," was proven to significantly enhance the players' emotional and cognitive engagement. Overall, the game was designed as an open-ended learning environment, an approach empirically shown to support the development of divergent thinking the ability to generate a variety of unique ideas (Kwon et al., 2006).

The analysis of results indicated a potential positive impact on creativity, as validated by experts and supported by qualitative observation results of 11 children. Observation during implementation revealed deep engagement, with the children's average active playtime reaching 80% of the allocated session. Children actively experimented with non-conventional combinations demonstrating originality; this was reflected in 65% of the final designs being assessed as unique (divergent) by the research team based on a modified Torrance Creativity Index (TCI). The aesthetic diversity in their final products (fashion designs) ranging from realistic fashion designs to 5 pure fantasy-themed sketches indicates that the game successfully facilitated authentic self-expression. Implicitly, this process was not only entertaining but also introduced children to the basic concepts of algorithms and logic through Scratch, which forms the foundation of computational thinking.

3.2 Discussion

The findings of this research strongly affirm that visual programming platforms like Scratch serve as effective mediums for creativity development, extending beyond their role as mere technical teaching tools. The "Girls Day" game becomes a case study demonstrating how proper design principles can transform children from passive consumers into active creators. This pedagogical transformation lies at the core of constructivism theory, which posits that the most effective learning occurs when individuals actively construct personally meaningful artifacts (Bada & Olusegun, 2015).

The key elements in the game's design variety, instant feedback, and an open-ended structure theoretically correlate with conditions that enable the achievement of "flow" or optimal experience (RR Ella, 2025). Flow occurs when challenges and user abilities are balanced, creating a zone of deep creative focus. Thus, this digital dress-up activity evolves from mere play into a complex problem-solving process and an exercise in divergent thinking. This aligns with the argument that well-designed video games function as "problem spaces" that motivate active and deep learning.

This project also serves as a tangible example of the synergy between art and technology, embodying the principles of STEAM education. The ability to integrate coding logic with visual expression directly supports the development of participatory competencies in creative media, where children not only learn technology but also learn to express themselves through it (Kafai & Peppler, 2011). These findings are supported by the project-based learning framework, which has proven effective in developing 21st-century skills such as creativity, collaboration, and digital literacy (Pare & Sihotang, 2023).

Furthermore, this game has a significant impact within the context of gender equality in technology. By providing a relevant and engaging environment for young girls (the world of fashion), the "Girls Day" project has the potential to enhance their self-efficacy or confidence in using technology and coding. Research has shown that contexts aligned with interests are a key factor in empowering girls in STEM fields. The practical implications are clear: integrating visual coding like Scratch into art and design curricula at the elementary school level offers an inclusive and effective pathway to fostering future innovators.

To complement this discussion, the respondent data forming the basis of this research is presented in the following table:

Table 1: Respondent

Respondent	Category	Job Position	Work Experience
R1	Fashion Industry Expert	Senior Children's Fashion Designer Head of Digital Innovation,	18
R2	Fashion Industry Expert	Global Children's Apparel Company	15
R3	Fashion Industry Expert	Children's Fashion Trend Consultant	10

R4	Educational Game Development Practitioner	Creative Director, Educational Game Studio	12
R5	Educational Game Development Practitioner	Technology Curriculum Developer for Children	8
R6	Educational Game Development Practitioner	Children's Game UI/UX Designer	9
R7	Educational Game Development Practitioner	Professor of Child Development and Creativity Education	25
R8	Educational Game Development Practitioner	Educational Technology Lecturer, Digital Learning Specialist	18
R9	Educational Game Development Practitioner	Child & Media Social Researcher	14

Here is the table of interview questions and the summary of answers from each respondent:

Table 2: Questions and the summary of answers

Aspect of Discussion	Interview Question	Summary of Respondent Answers
Fashion Design Paradigm Shift	How do you see the paradigm shift in fashion design from conventional to digital in the last decade?	Massive, from manual sketching to 3D design and fabric simulation; saves time and cost, opens up experimentation; allows for mass personalization and rapid market response.
Children's Digital Fashion Trends	What are the latest digital fashion design trends relevant for the children's segment?	Interactivity and fantasy (clothes changing color, responding to movement); easily accessible customization (choosing stickers, changing patterns), visual narratives.
Impact of Interactive Games on Children's Perception	How can digital platforms, especially interactive games, influence children's perception and appreciation of fashion design?	Games act as a gateway; children understand visual composition, color, and proportion; they learn fashion is about self-expression, identity experimentation, and art.
Potential of Scratch as an Educational Tool	How do you assess the potential of Scratch as an educational game development tool for children, especially in the context of creativity?	It's golden; its visual interface and intuitive blocks allow children to focus on ideas and imagination; it bridges logical thinking and artistic expression; highly empowering.
Challenges in Designing Educational Games for Girls	What challenges do you face when designing educational games that target the development of creative skills in girls?	Avoiding gender stereotypes; offering diverse themes, professions, and styles; ensuring content is engaging and relevant without underestimating their intelligence.
Keeping Dress-Up Games Educational	How do you ensure dress-up games remain educational and are not just entertainment-oriented?	By integrating explicit learning objectives (cultural patterns, clothing functions); adding challenge elements and constructive feedback (e.g., a digital judge).
Integration of Creativity Theory & Digital Games	How does children's creativity development theory integrate with digital game-based learning?	The Four P's model (Person, Process, Press, Product) is highly relevant; games act as the 'Press' that supports the 'Person' in the creative 'Process' to produce a 'Product'; this strongly supports project-based learning.

Empowering Girls via Dress-Up Games (Girls Day)	In your opinion, how can specifically designed dress-up games empower girls in the context of 'Girls Day'?	They provide a platform for self-expression and identity exploration; allow experimentation with diverse styles, professions, and cultural roles; strengthen self-confidence; and challenge gender stereotypes.
Scratch: Computational & Artistic Skills	What aspects of the Scratch application uniquely support the development of both computational skills and artistic expression in children?	It bridges logical thinking and visual creativity; children learn computational concepts while designing characters and animations; it offers instant visual feedback.

4. Conclusion

The findings from the study involving 11 children conclude that visual programming platforms like Scratch serve as an effective medium for creativity development, transcending their technical role. The "Girls Day" game acts as a case study illustrating how the right design principles can transform children from passive consumers into active creators, aligning with constructionism theory which posits that effective learning occurs when an individual actively constructs meaningful artifacts. The key design elements of the game variety, instant feedback, and open-ended structure correlate with conditions for flow or optimal experience. Consequently, this digital dress-up activity evolves from mere play into a complex problem-solving process and an exercise in divergent thinking. This is consistent with the argument that well-designed video games function as "problem spaces" that motivate active and deep learning.

The project also stands as a concrete example of the synergy between art and technology (STEAM). The ability to integrate coding logic with visual expression directly supports the development of participatory competence within creative media. These findings are supported by the Project-Based Learning (PBL) framework, which is proven effective in developing 21st-century skills. Furthermore, the game has a significant impact within the context of gender equality in technology. By providing an environment relevant and engaging for young girls (the world of fashion), the "Girls Day" project potentially enhances their self-efficacy and confidence in using technology and coding. Research suggests that interest-congruent contexts are a key factor in empowering girls in STEM fields. The practical implications are clear: integrating visual coding platforms like Scratch into art and design curricula at the elementary school level offers an inclusive and effective pathway to fostering future innovators.

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Conflict of interest

the authors declare no conflict of interest.

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