

A Preliminary Study on Enhancing the Effectiveness of Interactive Design Learning Through Digital Storytelling and the Golden Circle Theory

Chia-Hui FENG^{ab*} & Hao-Chiang Koong LIN^a

^a *Department of Information and Learning Technology,
National University of Tainan, Tainan City, Taiwan.*

^b *Department of Creative Product Design,
Southern Taiwan University of Science and Technology, Tainan City, Taiwan.*

*wanda@stust.edu.tw

Abstract: This research investigates how integrating the Golden Circle theory with digital storytelling methods enhances interactive design learning, while developing an innovative situational teaching framework. The study focuses on third-year product design students at a technological university, employing a quasi-experimental research design. The experimental group applies the Golden Circle's three-level thinking framework (WHY, HOW, and WHAT), combining digital storytelling techniques with AIGC situational computing for design creation. In contrast, the control group adopts traditional methods using image libraries and presentation-based narratives for situational design. Through the Golden Circle framework, this study systematically guides students in exploring design values, deepening their understanding of user needs, and fostering innovative solutions. The expected outcomes include cultivating the ability to construct meaningful user emotional connections and demonstrating advanced design thinking capabilities.

Keywords: Golden Circle, Digital Storytelling, AIGC, Learning Emotion

1. Introduction

The rapid development of generative artificial intelligence technology has brought significant breakthroughs in content creation. Research shows that through this technology, users can automatically generate various types of digital content based on their needs, including multimedia forms such as images, text, and videos (Du et al., 2023; Ming et al., 2022; Raffel et al., 2020). Progress has advanced from data understanding to a new phase of content generation. Through AI systems, users can generate diverse content automatically based on personalized needs, demonstrating the important advancement from machine perception to creative generation (Wu et al., 2023). However, with the rapid development of AI-generated content technology, the field of design education is experiencing an unprecedented major transformation (Wu et al., 2023). Classroom observation reveals a lack of training in emotional persuasion and storytelling amongst students when communicating design concepts to evoke emotional resonance. Therefore, it is necessary to reinforce the concept of contextual storytelling. Transitioning from traditional to digital storytelling and integrating it into design education, it is crucial to enhance students' design expression, communication, and persuasive influence.

According to Sinek (2009) Golden Circle Theory, there is a key difference in how organizations communicate product value and design: most organizations start with product features (What), then explore implementation methods (How), and finally consider their reason for existence (Why). However, a truly successful organization takes the opposite approach: beginning with brand philosophy and values (Why), and then using the appropriate methods (How) to translate these ideas into tangible products. This inside-out thinking pattern proves to be more effective because it

stimulates the area of the brain responsible for decision-making, encouraging customers to not only purchase the product itself but also to identify with and support the underlying philosophy, thereby establishing a deeper emotional connection.

Digital design has become an irreversible development trend. Breakthroughs in AI content generation technology, particularly the innovative development of generative image models such as Stable Diffusion, Midjourney, and DALL-E 3 (Wu et al., 2023) brought revolutionary changes in the field of visual design. These technologies not only enable the quick generation of design sketches and visual elements through prompts but also precisely control details such as product materials and colors, significantly improving the efficiency of contextual design validation and iteration processes. This visual transformation manifests in professional practice and demonstrates significant effectiveness in the educational field. Research by Liu et al. (2023) indicates that students who use digital visual collaboration demonstrate higher learning motivation, and it is particularly notable in perceived competence, enabling design thinking activities to enhance creative confidence and deepen understanding of user needs.

According to Wu et al. (2023), education is undergoing significant transformation in the AI digital wave, with changes manifesting not only in teaching models but also penetrating deeply into the impacts and innovations within the design field. To create a design with lasting impact, students not only have to solve problems but also learn how to construct compelling and persuasive interactive product stories. The purpose of this research is to explore product interaction design scenarios using different proportions of Golden Circle, to strengthen students' ability in product value positioning and digital storytelling capabilities. Through systematically incorporating AI-generated content computational capabilities and effectively utilizing the Golden Circle starting from 'Why', students can create more persuasive product stories.

2. Literature Review

2.1 Golden Circle Theory

During an influential TEDx talk, Sinek (2009) introduced the Golden Circle theory, which revolves around three core questions: *Why*—addressing user needs and values, *How*—explaining product features and selling points, and *What*—describing product attributes, functions, and pricing, as shown in Figure 1. The design process begins with understanding the reasons behind needs before focusing on results. When an organization's 'Why' succeeds, it creates resonance at a deeper emotional level, motivating employee engagement and long-term purchasing from target groups (Straker & Nusem, 2019). Successful companies and leaders adopt this model for thinking, acting, and communicating, thereby standing out in the market.

In "Start with Why," Simon presents an inside-out thinking approach: beginning with the core belief of why the product exists, clarifying how to take action, and finally addressing what the product or service specifically delivers (Sinek, 2009). By using product stories to help developers successfully pitch their ideas, they can convey the product's definition and value through an emotionally engaging brand story. The designers can distinctly convey the core values and missions of product design, attracting consumers who share similar ideals. This approach extends beyond merely describing product functions and establishing emotional connections and resonance with customers.

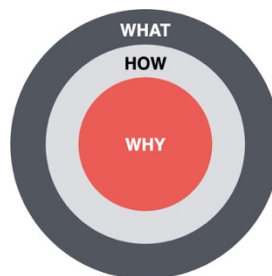


Figure 1. Golden Circle.

2.2 *Storytelling*

Humans have always connected through storytelling, whether through oral transmission of ancient epics to younger generations or cave wall drawings, as exemplified by the Las Caux Caves prehistoric "Louvre" discovered in southwestern France in 1940. This remarkable discovery occurred when a boy from the village of Montignac and his friends tested the cave's depth by throwing stones inside, which revealed the prehistoric murals that would allow the interpretation of prehistoric human stories. Leroi-Gourhan (1982) described how prehistoric cave art can vividly tell a story. Scholars traced the journey of artifacts from painting materials to prehistoric masterpieces: the dramatic narrative highlights prehistoric originality, and various forms of narration recreate the background and vitality behind prehistoric art.

People enjoy listening to stories because as the storyteller describes, the listeners simultaneously construct images in their minds, drawing them into the stories and closing the distance between them. Storytelling enhances the emotional aspects of narratives because audiences internally construct a visual representation of the story. Dias and Cavalheiro (2021) utilizes storytelling as a tool in brand communication, eliciting active responses from consumers. The scope of storytelling is not limited to marketing strategies but extends to the overall functions of the organization (Kemp et al., 2023). The key element for storytellers and audiences to mutually influence and co-create a story lies in the relationship between audience and narrative. Collective storytelling can develop shared perspectives, promote knowledge sharing, and enhance collaborative teamwork, leading to more innovative outcomes (Chen et al., 2023). Furthermore, incorporating contextual story perspectives, adopting emerging presentation techniques, embracing multiple mindsets, and integrating various viewpoints cultivates empathy while demonstrating emotion, characteristics, and value to capture audience's attention. Although this requires conscious efforts, storytelling significantly enhances narrative design in teaching (Parrish, 2006).

Engaging students in the digital storytelling process enhances their critical thinking, creativity, and communication skills, allowing them to practice media literacy, which is crucial for active participation in this digital age (Alalem, 2023). Chen et al. (2023) states that digital storytelling allows students to move from depicting to generating creative and rational ideas, showing the evolution from the initial concept to the final product. Digital storytelling allows students to combine their creativity with practical validation and logical organization. involves practical validation and logical organization, highlighting creativity more effectively than traditional static products. Through digitalization, thinking and creative processes become tangible, supporting metacognitive and creative capability development, and serving as an effective method for cultivating imagination and creativity. Storytelling can train the brain to maintain cognitive abilities (Mitty, 2010), engaging both hemispheres in thinking and expression. The intuitive right brain helps observe and generate creative ideas, establishing connections; then it shifts to the rational left brain to form action and execute plans (Fog et al., 2005).

2.3 *AI-Generated Content*

As deep learning and large language model technologies rapidly developed, the applications of Generative Artificial Intelligence (GAI) and AI-Generated Content (AIGC) have attracted significant public attention (Alasadi & Baiz, 2023; Zhang et al., 2023). AIGC users can customize various content types through widely applied generative tools and platforms such as Midjourney, Stable Diffusion, and DALL E (Wu et al., 2023). While generative content brings revolutionary changes to design education, it must be used with teacher guidance and also take into account the limitations of AI (Baidoo-Anu & Ansah, 2023).

The primary practical benefit of AI visual technology lies in transforming textual descriptions or conceptual ideas into concrete images, as shown in Figure 2, thereby promoting innovative thinking in the design process. Text-to-image conversion improves the creative process in design and strengthens concepts (Albaghajati et al., 2023; Liao et al., 2020). The ability to transform linguistic messages into visual representations is a fundamental skill of designers. Concept design visualization promotes team discussion and establishes a shared understanding of design concepts, while consensus

on visual design representations influences collaboration between designers and programmers (Pei et al., 2011).

Research by Liao et al. (2020) indicates that AI can support the early stages of design conceptualization while playing a role in triggering empathy and promoting engagement. The study presents AI-assisted design support methods based on knowledge-driven and decompose-and-integrate principles. According to Huang et al. (2024), AIGC provides creative challenges for students of varying abilities, encouraging creative thinking in product design conceptualization learning to allow students with different proficiency levels to improve their design ideation skills.



1. Yee was hospitalized after a car accident with a broken bone. He was concerned about how to proceed with rehabilitation treatment.



2. Yee tried walking but was afraid of causing discomfort to his wound.



3. The doctor recommended a digital assistive device that can be used with an app to detect bacteria in the wound and monitor posture angle.



4. Yee can connect to the hospital via mobile phone.



5. The APP alert him when there is pressure on the affected area.



6. With this digital assistive device, Yee can carry out rehabilitation training without worries.

Figure 2. Example of a user storyboard.

3. Methodology

Starting with the "Why" from the Golden Circle and introducing product storytelling, this study explores different proportions of the Golden Circle to describe situational storytelling methods. It examines the differences between using image libraries for visual storytelling in design presentations and applying AIGC computation for product storytelling in a situational context.

3.1 Participants

The study recruited forty third-year product design students from a Taiwanese technical university, employing a quasi-experimental method with two experimental groups and one control group. All participating students have experience with computer-aided drawing. Data collection takes place in a professional computer laboratory equipped with desktop computers, iPads, and stylus devices for students to use.

3.2 Experimental Procedures

The researchers explained the experimental purpose to participants and obtained informed consent forms. The study took place over six weeks on Golden Circle proportion practice and contextual storytelling research. Participants completed four online scales before and after the learning process:

the AEQ learning emotion scale, collaboration tendency assessment, communication apprehension questionnaire, and learning satisfaction survey, which were subsequently used for statistical analysis. Finally, researchers interviewed participants after they completed the experiment. The complete experimental process is shown in Figure 3.

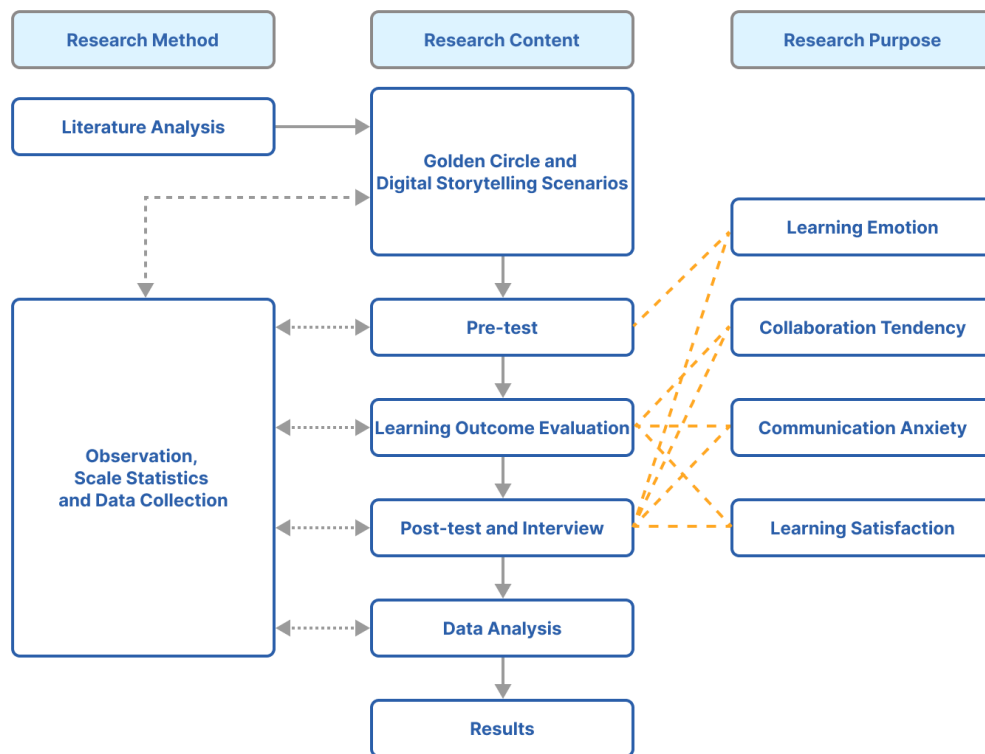


Figure 3. The experimental procedure.

The independent variables in this study are the variations in the proportions of the Golden Circle's Why, How, and What, used to describe situational storytelling, with the control group utilizing traditional hand-drawn scenarios and the experimental group utilizing AIGC computational scenarios to assess the effectiveness of product storytelling. The dependent variables consist of four scales: the AEQ learning emotion scale, collaboration tendency assessment, communication apprehension questionnaire, and learning satisfaction survey. These measurements analyze differences in student performance before and after learning, examining the impact of different methods on various learning performance indicators. Control variables are implemented to ensure the reliability of research findings.

3.3 Course Design

The research is the Golden Circle storytelling teaching material presentation, primarily utilizing the online platform Figma to create digital teaching materials centered on the Golden Circle theory and contextual narratives. The teaching process integrates computer and tablet equipment to deliver enhanced learning experience. Students will engage in collaborative group learning, using cloud-based tools for discussion and editing after class. Teachers can provide online guidance or add comments, as detailed in Table 1.

Table 1. Comparison and experimental group activities.

Class	Theme	Experimental group activities	Control group activities
1	Course Overview	Explain course content using SDG 3: Health and Well-being - Ensure and promote healthy living and well-being for all ages. Using Golden Circle methodology to introduce digital storytelling narrative approach.	

2	Field Observation	Document field observations of key storylines. Record observation content, time, location, and subject using visitor journey maps for analysis and organization of results.	Document field observations of key storylines. Record observation content, time, location, and subject using visitor journey maps for analysis and organization of results.
3	Storyline Analysis	Apply Affinity diagram to analyze observation results. Use journey mapping to analyze and develop site pain points and design opportunities. Extract storylines from data, using AIGC images as the primary source. Establish story Persona framework including basic character information, types, background, and behavior descriptions.	Apply Affinity diagram to analyze observation results. Use journey mapping to analyze and develop site pain points and design opportunities. Extract storylines from data, using stock images as the primary source. Establish story Persona framework including basic character information, types, background, and behavior descriptions.
4	Context Storytelling	Create storyboard narratives. Construct story progression combining characters, locations, activities, and motivations. Use AIGC images as primary sources with text as supplementary to present a dynamic contextual environment.	Create storyboard narratives. Construct story progression combining characters, locations, activities, and motivations. Use stock image library as primary source with text as supplementary to present a dynamic contextual environment.
5	Golden Circle	Compare different story developments using Golden Circle - Why: Clarify goals, vision, and beliefs; How: Key value and product characteristics; What: Product attributes and functions.	Use pain point scenarios and solution-based contextual stories as comparative references between narrative stories and products.
6	Context Report	Final AIGC Scenario Story Presentation.	Final Solution Scenario Story Presentation.

4. Expected Contributions

Through this research implementation, the expected outcomes in contextual storytelling design include showcasing advanced creativity and achieving precision in contextual descriptions. By applying the Golden Circle methodology (Why-How-What) to contextual storytelling, this approach refines communication strategies that amplify emotional resonance with audiences. This framework not only enhances the ability to craft immersive and compelling narrative environments but also ensures accurate contextual alignment, effectively eliciting emotional engagement from the audience.

The expected contributions of this research are as follows:

- **Deepening Golden Circle Theory:** Guiding students to start from the fundamental "Why" perspective to enhance the depth and impact of design in addressing user needs and values. This involves exploring variations in product storytelling through varying proportions of the Golden Circle (Why-How-What) components to strengthen the value propositions of the products.
- **Enhancing Narrative Skills:** Strengthening students' communication abilities through storytelling training to design emotionally engaged content, enabling students to convey emotional aspects effectively and accurately.
- **Collaborative Learning and Communication:** Through group-based collaborative learning and hands-on software development practice, students will co-create using Adobe Figma cloud-based

online materials to learn online communication skills. This process will help the team develop a shared understanding and consensus on the SDGs theme of “Good Health and Well-Being.” By collaboratively optimizing and iterating interactive content in the cloud, students will grow and develop through the experience of cooperative learning.

Acknowledgements

This research was funded by the Ministry of Education of Taiwan under the Teaching Practice Research Program (Grant No. PSK1134529).

References

- Alalem, A. (2023). Digital storytelling for cultivating a participatory culture in first-year composition. *Computers and Composition*, 69, 102792.
- Alasadi, E. A., & Baiz, C. R. (2023). Generative AI in education and research: Opportunities, concerns, and solutions. *Journal of Chemical Education*, 100(8), 2965-2971.
- Albaghajati, Z. M., Bettaieb, D. M., & Malek, R. B. (2023). Exploring text-to-image application in architectural design: Insights and implications. *Architecture, Structures and Construction*, 3(4), 475-497.
- Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Journal of AI*, 7(1), 52-62.
- Chen, Y.-T., Liu, M.-J., & Cheng, Y.-Y. (2023). Discovering scientific creativity with digital storytelling. *Journal of Creativity*, 33(1), 100041.
- Dias, P., & Cavalheiro, R. (2021). The role of storytelling in the creation of brand love: the PANDORA case. *Journal of Brand Management*, 29(1), 58.
- Du, H., Li, Z., Niyato, D., Kang, J., Xiong, Z., & Kim, D. I. (2023). Enabling AI-generated content (AIGC) services in wireless edge networks. *arXiv preprint arXiv:2301.03220*.
- Fog, K., Budtz, C., & Yakaboylu, B. (2005). *Storytelling*. Springer.
- Huang, K.-L., Liu, Y.-C., Dong, M.-Q., & Lu, C.-C. (2024). Integrating AIGC into product design ideation teaching: An empirical study on self-efficacy and learning outcomes. *Learning and Instruction*, 92. <https://doi.org/10.1016/j.learninstruc.2024.101929>
- Kemp, A., Gravois, R., Syrdal, H., & McDougal, E. (2023). Storytelling is not just for marketing: Cultivating a storytelling culture throughout the organization. *Business Horizons*, 66(3), 313-324.
- Leroi-Gourhan, A. (1982). The archaeology of Lascaux cave. *Scientific American*, 246(6), 104-113.
- Liao, J., Hansen, P., & Chai, C. (2020). A framework of artificial intelligence augmented design support. *Human-Computer Interaction*, 35(5-6), 511-544. <https://doi.org/10.1080/07370024.2020.1733576>
- Liu, Y.-L. E., Lee, T.-P., & Huang, Y.-M. (2023). Enhancing university students' creative confidence, learning motivation, and team creative performance in design thinking using a digital visual collaborative environment. *Thinking Skills and Creativity*, 50, 101388.
- Ming, Y., Hu, N., Fan, C., Feng, F., Zhou, J., & Yu, H. (2022). Visuals to text: A comprehensive review on automatic image captioning. *IEEE/CAA Journal of Automatica Sinica*, 9(8), 1339-1365.
- Mitty, E. (2010). Storytelling. *Geriatric Nursing*, 31(1), 58-62.
- Pei, E., Campbell, I., & Evans, M. (2011). A taxonomic classification of visual design representations used by industrial designers and engineering designers. *The Design Journal*, 14(1), 64-91.
- Raffel, C., Shazeer, N., Roberts, A., Lee, K., Narang, S., Matena, M., Zhou, Y., Li, W., & Liu, P. J. (2020). Exploring the limits of transfer learning with a unified text-to-text transformer. *Journal of machine learning research*, 21(140), 1-67.
- Sinek, S. (2009). *Start with why: How great leaders inspire everyone to take action*. Penguin.
- Straker, K., & Nusem, E. (2019). Designing value propositions: An exploration and extension of Sinek's 'Golden Circle' model. *Journal of Design, Business & Society*, 5(1), 59-76.
- Wu, T., He, S., Liu, J., Sun, S., Liu, K., Han, Q.-L., & Tang, Y. (2023). A brief overview of ChatGPT: The history, status quo and potential future development. *IEEE/CAA Journal of Automatica Sinica*, 10(5), 1122-1136.
- Zhang, C., Zhang, C., Li, C., Qiao, Y., Zheng, S., Dam, S. K., Zhang, M., Kim, J. U., Kim, S. T., & Choi, J. (2023). One small step for generative ai, one giant leap for agi: A complete survey on chatgpt in aigc era. *arXiv preprint arXiv:2304.06488*.