Application of Image-Generative AI in Visual Merchandising Class

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In recent years, artificial intelligence (AI) has seen extensive application as a new technology with great potential in educational contexts (Holmes et al., 2019; Ngo, 2023). Today, retailers use visual merchandising to make them stand out in the market and ultimately draw more customers (Lashin et al., 2022). At the same time, many software programs were used in visual merchandising, such as Wooqer, MockShop, Negen POG (Slashdot, 2024), or Adobe Photoshop (Knochel, 2016). Given the growing interest in visual-centric teaching and learning (Murphy & Mitchell, 2023), there is a gap in using AI in educational settings for visual merchandising. To address this gap, this study aimed to evaluate the effectiveness of using an image-generative AI (Dall-E 3) to create a visual display by applying design fundamentals, including the elements and principles of design. It also compared the outcomes generated by different prompt sets and identified the most effective approach for the image creation process, enriching practical student learning achievement in visual merchandising.

Since the introduction of Dall-E 2 (ChatGPT) in 2022, Image-Generative AI has experienced significant growth and demonstrated remarkable utility in generating images from text prompts or image editing, including artistic and realistic images (Gozalo-Brizuela & Garrido-Merchán, 2023). Meanwhile, the use of ChatGPT in education has become a promising tool by cultivating a more significant interest in learning (Xia et al., 2022) and improving learning efficiency for both students and teachers (Montenegro-Rueda et al., 2023). However, limited studies exist on applying ChatGPT to visual merchandising in educational settings. This study employed the constructivist learning theory to demonstrate ChatGPT integration in an education setting. Constructivism is a learning theory that considers learning as an active, contextualized process of building knowledge and encourages students to create their own understandings through meaningful experience (Chaudhary et al., 2024).

In the initial stage, a series of prompts were created and tested in several popular image-generative AI models such as Midjourney, Stable Diffusion, Dreamstudio, Dall-E 3, and AI test kitchen. Among those, Dall-E 3 was chosen for this study because Dall-E 3 showed the most stable, realistic results and was easy to use. Dall-E 3, built on ChatGPT, is one of the most popular tools for the general public (Kshetri et al., 2023). The prompts were created by combining one of nine design elements (i.e., line, shape, size, color, texture, proportion, direction, sequence, tension) and one of seven design principles (i.e., unity and harmony, balance, repetition, rhythm, emphasis, contrast, surprise) (Bell, 2022). The window display images created from two different prompts were investigated. Prompt 1 was *Create a 2025 Summer holiday window display for a women's clothing store, using "A" as an element and "B" as a design principle*. Prompt 2 was *Create a 2025 Summer holiday window display for a women's clothing store, using "A" as an element and "B" as a design principle*. Definitions of A and B were included only in Prompt 2. A total of 63 sets of prompts were utilized to create

126 window display images. Definitions were quoted from books and articles (Bell, 2022; Jelinčić, 2021; Pipes, 2003).

Some examples of display outcomes are shown below.

 Figure 1: Result of Prompt 1	<u>Prompt 1:</u> Without the definitions of color and unity/harmony. Figure 1 presents "color" elements and "unity/harmony" in both garments and decorations. However, the decorations are too dense.
 Figure 2: Result of Prompt 2	<u>Prompt 2:</u> With the definitions of color and unity/harmony. Figure 2 features a mix of "color" on clothing items and texture, creating a harmonious visual. However, Dalle-E 3 started putting the wording of prompts or nonsense words in the background. The display also includes a color wheel in the background simply when the definition of color is used in the prompt.

By investigating over 100 images generated, overall, the prompts with more details resulted in the images of more complexity and clarity, particularly in terms of applying design elements and principles as well as creating a good "thematic display." Dall-E 3 demonstrated the ability to interpret prompts and create images quickly (Kasneci et al., 2023), successfully incorporating the requested design elements/principles and creatively combining outfits, backgrounds, and decorations. However, Dall-E 3 failed to demonstrate how to prioritize prompt wording over the intended design elements and principles. Rather, the requested words like "balance" and "color" were written in the background. In addition, Dall-E 3 seems only to grasp basic design elements/principles from the prompt to create a simple concept, resulting in a simplified interpretation, such as a color wheel, instead of creating a color story. Notably, the image quality becomes unstable and decreases after the 50th image, as Eaton et al. (2021) reported, in which ChatGPT declined response quality several times. Therefore, integrating student's personalized and efficient experiences into this process could enhance outcomes, using it as a tool to support and enhance learning (Pavlik, 2023).

As emphasized by the constructivist method of teaching and learning, applying Dall-E 3 enables students to build images and knowledge from meaningful experiences when they do trials with

prompts and evaluate generated images. Students can immerse themselves in conversational contexts with Dall-E 3, refine their input, and receive immediate feedback.

The findings of this study support that educators can introduce AI image-generators as an applicational resource when teaching students for their design purposes, which can aid in preparing them for the fashion industry's quickly changing styles and advanced technology. Moreover, based on the result images from Dall-E 3, students can use another design program as the next step to modify it for their design work. However, the study's findings may not be applicable to other AI image generators. Future research should investigate more applications and prompts to develop other classification methods.

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