EXPLORING THE SYNERGY OF AI GENERATIVE FILL IN PHOTOSHOP AND THE CREATIVE DESIGN PROCESS UTILISING INFORMAL LEARNING.

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ABSTRACT

This paper examines the emerging use of AI generative fill techniques in Adobe Photoshop (software, Adobe Inc, California, United States) coupled with informal learning situations, to enhance the creation of product posters for design exhibitions. By leveraging the capabilities of AI, designers can streamline their creative workflows, allowing for more efficient and innovative design outcomes [1]. The aim of this paper is to examine the benefits of Photoshop's AI generative fill in comparison to traditional manual methods for new graduates exhibiting at their first design show (New Designers, London), and to gauge the influence of informal learning settings in supporting designers' adoption of AI-driven design techniques. The findings of this research demonstrate a paradigm shift in the creative process, as AI generative fill in Photoshop emerges as a powerful tool for designers seeking efficiency, inspiration, and novel artistic directions. The findings also show how informal learning settings have played a vital role in nurturing new designers' adoption of AI-driven design techniques.

Keywords: AI, Generative Fill, Photoshop, Design Process.

1 INTRODUCTION

In recent years, the emergence of Artificial Intelligence (AI) technologies in creative industries has led to ground-breaking advancements in design processes, enabling creative expression and expanding the boundaries of human imagination [2]. The integration of AI into the creative domain has opened new avenues for designers, empowering them with innovative tools to enhance their design capabilities [2]. Among these developments, the utilisation of AI generative fill techniques in Adobe Photoshop has emerged as an innovative creative tool, promising to enhance efficiency and enhance the creative design process. Photoshop's generative AI fill is a tool that uses machine learning to intelligently fill in missing or selected areas of an image with content that seamlessly matches the surrounding context, allowing for efficient and realistic image editing with minimal manual input. It analyses the image to understand its content and context, then generates new pixels to complete the area, blending seamlessly with the existing image.

Previously, the creation of product design exhibition posters by new graduates for exhibitions such as New Designers, involved laborious and time-consuming tasks, such as searching for an appropriate background image, perspective matching renders to chosen background images, and attempting to manually fix issues with tools such as clone replacement and content-aware fill. While these methods have yielded impressive results, they often require extensive effort and time, restricting designers' ability to explore multiple iterations and experiment with diverse design concepts. The use of AI generative fill in Photoshop has now opened new avenues for designers, enabling them to expand their creative process and streamline their workflow.

AI generative fill leverages sophisticated algorithms and neural networks to analyse and understand patterns, styles, and aesthetics from vast datasets of existing designs, and then venture into the realm of imagination and creation [2]. This technology allows Photoshop users to generate visually compelling elements, textures, and patterns automatically, reducing the need for manual input and repetitive tasks. As a result, designers can allocate more time and energy to the conceptualisation and ideation stages,

developing innovation and creativity in the poster design process. However, the benefits that AI generative fill offers extend beyond just efficiency gains. By facilitating the rapid generation of design elements, it enables designers to explore diverse sources of inspiration, encountering numerous design styles, and therefore pushing the boundaries beyond their traditional design conventions. By developing and integrating various design styles, social influences, and design trends, designers can create product design posters that deeply connect with target audiences.

The aim of this research paper is to comprehensively analyse if and how AI generative fill in Photoshop is being utilised to increase efficiency and improve the creative design process in the context of product design posters for exhibitions. By exploring real-world case studies, conducting user surveys, and assessing design outcomes, this research provides evidence of the tangible impact AI generative fill has on the design exhibition industry.

2 RESEARCH METHOD

2.1 Literature Review

Within the advancements of AI technology, generative AI has become a significant area of research [3]. Generative AI is an innovative technology that allows machines to surpass traditional tasks such as classification and predication, and can generate novel and creative content automatically by utilising input data [2, 3]. Generative AI systems can produce novel outputs such as images, music, text, and more, that resemble human generated content [2]. Text-to-image AI models enable the creation of images from textual descriptions, and research into these models has been increasingly active [4]. Multiple approaches have been developed to create images from textual descriptions, including Generative Adversarial Networks (GAN), Variational Autoencoders (VAEs), and Diffusion-based Models (DMs) [5].

The literature demonstrates compelling evidence supporting the transformative role of generative AI in revolutionising the field of design [1]. Generative AI technologies have emerged as powerful tools that impact the design process positively, streamlining tasks, enhancing collaboration, and significantly improving efficiency [1]. The integration of AI tools in design has enabled automation of design recommendations, layout suggestions, and colour palettes, further augmenting designers' capabilities and creative output [6]. However, the literature also recognises inherent limitations of AI within the design domain [1]. While AI generative systems excel in analysing patterns and generating content based on existing data, they fall short in exhibiting innate creativity, emotional intelligence, and cultural context – qualities that human designers possess and infuse into their work [1].

2.2 Primary Research/Methodology

This research is centred around the unique context of new product design graduates who had recently presented their final year projects at their degree show, being selected to represent their university and exhibit at the New Designers Exhibition in London. Following their selection, students were informed of the necessity to produce updated and enhanced posters within a remarkably short 2-day turnaround time frame. This rapid adaptation demanded not only creative agility but also a pragmatic approach to incorporate feedback they had received from the initial degree show presentations and subsequent design reviews conducted by members of New Designers team at the university. The graduates were introduced into an informal working group, through WhatsApp (Social Media Platform, California, United States), where they all shared their progress and updates, and received feedback from staff team members and the other graduates. The graduates were using Adobe Photoshop for the creation of their posters, with a notable adoption of Photoshop's AI generative fill that had only been released into the beta version that same month (June 2023).

To analyse the research findings a mixed-method approach was adopted, ensuring an in-depth understanding of the implications of Photoshop AI generative fill in this design practice. To gauge the effectiveness and implications of this tool within this setting, a questionnaire was developed and given to the graduates, comprising both quantitative and qualitative questions. The quantitative analysis, through a 5-point Likert scale questionnaire, focuses on evaluating efficiency, productivity, and

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creativity, measured through key performance indicators such as design iteration time, visual appeal, and user satisfaction, statistically analysed for comparison between AI generative fill and manual approaches. The qualitative evaluation delves into designers' perceptions and experiences with Photoshop's AI generative fill, exploring attitudes, challenges, and ethical considerations surrounding its implementation. By analysing both quantitative and qualitative data, this research aims to provide a holistic understanding of the implications and potential of Photoshop's AI generative fill in this realm of product design.

3   RESULTS AND DISCUSSION

3.1 Adoption

11 recent graduates participated in this research study, and 8 (73%) of them used Adobe Photoshop's AI generative fill feature in their poster creation process. Notably, among the 8 participants who used generative fill, only 2 of them were using it for the first time, whereas the other 6 had prior experience with the feature. Adobe had released Photoshop's AI generative fill into their beta version 3 weeks before the creation of the New Designers posters. Meaning 75% of the graduates had actively sought out and leveraged Photoshop's AI generative fill within the first 3 weeks of its release. The participants with prior experience provided insights into their usage patterns. One participant mentioned using generative fill for editing images to rectify errors, while another utilised it for filling in background areas of composite images and scenery. Another participant utilised generative fill to widen images. Another experimented with generative fill upon its release, purely to explore its capabilities through test renders. While the last participant initially experimented with generative fill after encountering it on TikTok (Social Media Platform, Los Angeles, United States) and applied it purposefully for the first time in the creation of their New Designers poster. These varying experiences shed light on the diverse ways in which designers integrate new technological tools into their design processes and highlight the significance of adaptability and experimentation in navigating emerging design technologies.

The utilisation of Adobe Photoshop's AI generative fill feature by 73% of the graduates in this research project underscores the keen interest and proactive adoption of emerging technologies amongst the product design graduates. Despite being a brand-new tool, introduced merely three weeks prior to the project, a remarkable 75% of the graduates had already experimented with it. What is particularly intriguing is that this adoption was entirely self-driven, devoid of formal introduction or teaching within their university curriculum. This phenomenon reflects the students' intrinsic curiosity and eagerness to explore and harness the potential of AI advancements in their design practices. The high level of engagement with Photoshop's AI generative fill among the participants indicates a recognition of its transformative capabilities in streamlining and enhancing the design process. Beyond the immediate benefits of efficiency and creativity, the widespread adoption of Photoshop's AI generative fill among the graduates also prompts deeper reflections on the evolving role of designers in an increasingly technologically driven landscape and their proactive stance towards embracing technological innovation in design.

3.2 Benefits of AI generative fill in comparison to traditional manual methods

The use of Photoshop's AI Generative Fill by the design graduates yielded significant benefits, as highlighted by both quantitative Likert scale responses (Figure 1) and qualitative feedback from participants. Quantitatively, participants overwhelmingly endorsed the effectiveness of Photoshop's AI Generative Fill in producing the desired outcomes, with every participant strongly agreeing or agreeing that it achieved the intended results. This result underscores the tool's capability to meet designers' expectations and deliver on their creative visions efficiently. Participants indicated that the AI outcome required minimal to no manual modifications post-generation, further affirming its effectiveness in streamlining the design process. This automation not only saves valuable time but also reduces the likelihood of errors, ensuring a smoother and more efficient workflow. Participants overwhelmingly agreed that Photoshop's AI Generative Fill saved them time compared to manual task performance, with all participants strongly agreeing with this statement. This unanimous agreement highlights the tool's efficiency in streamlining the design process, thereby enabling designers to allocate their time more

effectively to other aspects of the creative process. Participants reported that the tool allowed them to achieve their desired outcomes more quickly and effectively, thereby enhancing overall productivity. Participants also rated the image quality of the AI-generated output favourably, with a majority agreeing or strongly agreeing that the output exhibited high image quality. This suggests that the tool effectively preserved the visual integrity of the poster elements, contributing to a professional and polished final product. Moreover, participants perceived moderate to high levels of creativity in the AI output, with the majority agreeing or strongly agreeing that it demonstrated creative potential. This indicates that the tool not only saved time but also facilitated creative exploration and experimentation, empowering designers to realise their design visions more effectively.

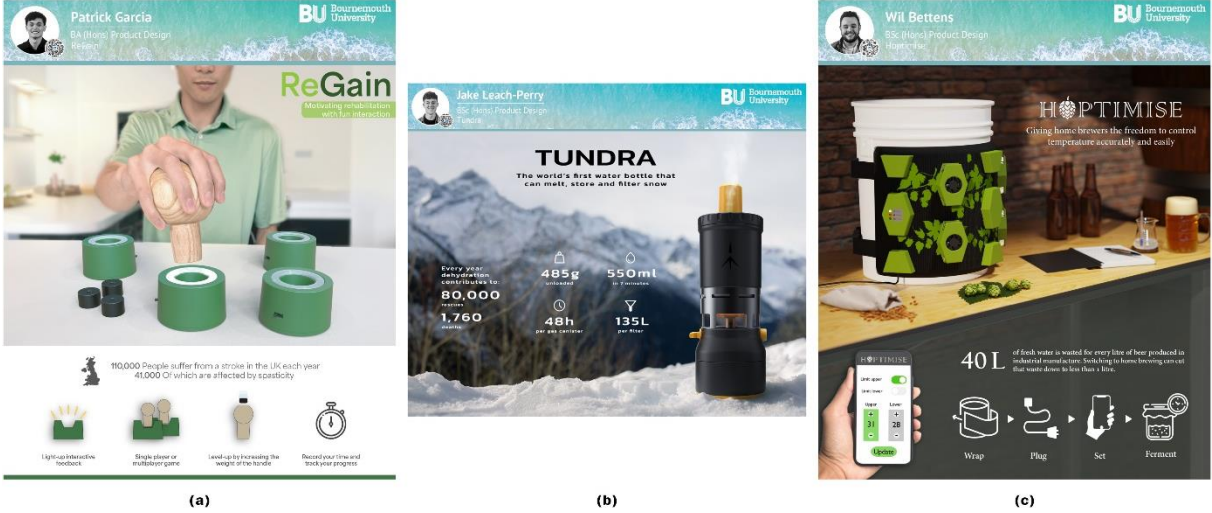| Photoshops AI Generative fill produced the required result I was after					The image quality of the AI out was high				
Strongly Disagree	Disagree	Neither agree/disagree	Agree	Strongly Agree	Strongly Disagree	Disagree	Neither agree/disagree	Agree	Strongly Agree
0	0	0	5	3	0	0	0	3	5

The AI outcome did not require any manual modification after					The creativity of the AI output was high				
Strongly Disagree	Disagree	Neither agree/disagree	Agree	Strongly Agree	Strongly Disagree	Disagree	Neither agree/disagree	Agree	Strongly Agree
0	0	0	5	3	0	0	1	5	2

Photoshops AI Generative fill saved me time in comparison to manually performing the task					My productivity was increased utilising Photoshops Generative AI fill				
Strongly Disagree	Disagree	Neither agree/disagree	Agree	Strongly Agree	Strongly Disagree	Disagree	Neither agree/disagree	Agree	Strongly Agree
0	0	0	0	8	0	0	0	4	4

Figure 1. Likert Scale Questionnaire Results

The qualitative results from the questionnaire, highlight the specific benefits derived from using Photoshop's Generative AI Fill. One notable advantage highlighted by participants was the substantial time-saving potential of the tool. By automating repetitive tasks and eliminating the need for labour-intensive manual modifications, generative fill enabled designers to expedite the creation of exhibition posters significantly. Participants reported saving hours of work, which would have otherwise been spent on tasks such as adding details to render scenes or searching for suitable background images. This time efficiency proved invaluable, particularly when facing tight deadlines associated with exhibition preparations. The participants also noted that generative fill expanded their creative possibilities by providing greater flexibility and freedom in design exploration. The tool allowed designers to experiment with various concepts and iterate on design options rapidly, thereby fostering innovation and encouraging creative risk-taking. Participants reported that generative fill enabled them to add realistic elements to their posters, enhancing visual appeal and elevating the overall quality of their designs. Additionally, the tool facilitated the integration of objects and backgrounds seamlessly, contributing to a more cohesive and polished final product. Specific examples of how the graduates utilised Photoshop's AI Generative fill in their product posters for New Designers include creating a whole background image (Figure 2a), expanding an existing background image (Figure 2b), and to add extra products and content into the foreground of their image that was not in their original render (Figure 2c).

(a)　　　　　　　　　　　(b)　　　　　　　　　　　(c)

Figure 2. Product Poster Examples

Overall, the findings suggest that Photoshop's AI Generative Fill offers substantial benefits to designers in the creation of product exhibition posters. By automating routine tasks, reducing manual workload, and enhancing creative flexibility, this technology empowers designers to achieve their design objectives more efficiently and effectively. Future research could further explore the long-term implications of AI integration in design processes and its impact on designers' roles, workflows, and creative practices. However, it is essential to acknowledge and further research into the tool's limitations and continue refining its capabilities to address diverse design needs comprehensively.

3.3 Informal Learning

Informal learning has played a vital role in nurturing the designers' adoption of AI-driven design techniques. The decision of students to independently learn and utilise Photoshop's Generative AI Fill reflects a broader trend of proactive engagement with emerging technologies within the design community. Motivated by a desire to enhance their skillset and streamline their design processes, the graduates sought out opportunities for self-directed learning, leveraging various resources and platforms available to them. Without formal instruction or guidance within their university curriculum, students took it upon themselves to explore the capabilities of Photoshop's Generative AI Fill, recognising its potential to advance their workflow and elevate the quality of their design outputs.

Social media platforms, such as TikTok and Instagram (Social Media Platform, California, United States), played a significant role in facilitating informal learning and knowledge dissemination among the graduates. Through TikTok, students encountered bite-sized tutorials, demonstrations, and showcases of Photoshop's Generative AI Fill in action, sparking curiosity and inspiring them to explore the tool further. The accessibility and diversity of content on platforms like TikTok provided students with a convenient avenue to discover and experiment with new technologies, transcending traditional barriers to learning. This research demonstrated the influence of social media on informal learning can be attributed to its ability to make knowledge easily accessible and develop a culture of continuous learning and innovation. By sharing tips, tricks, and insights on platforms like TikTok, individuals contribute to a collective pool of knowledge, empowering others to expand their skillset and stay in touch with technological advancements. The interactive and engaging nature of social media content creates a sense of community and collaboration, encouraging students to actively participate in discussions, share their experiences, and seek feedback from peers. The informal learning facilitated by social media aligns with the dynamic and rapidly evolving nature of the design industry, where staying ahead of emerging trends and technologies is essential for professional growth and competitiveness. By embracing informal learning through platforms like TikTok, the graduates demonstrated adaptability, resourcefulness, and a proactive approach to skill development, qualities that are highly valued in today's design landscape.

The establishment of an informal and supportive learning environment within a WhatsApp group among staff and student team members further enhanced the graduates' exploration of Photoshop's Generative AI Fill. By creating a sense of camaraderie and mutual support, the WhatsApp group encouraged active engagement and participation, creating a conducive atmosphere for learning and experimentation. The WhatsApp group facilitated ongoing dialogue and discussions surrounding the application of Photoshop's Generative AI Fill in their designs. Participants shared their experiences, exchanged ideas, and provided constructive feedback on each other's work, thereby promoting continuous learning and improvement. The iterative process of experimentation, feedback, and refinement produced an environment of innovation and excellence within the group, driving students to push the boundaries of their creativity and explore new possibilities afforded by the technology. The supportive and collaborative nature of the WhatsApp group nurtured a sense of belonging and community among the graduates. The group not only served as a platform for learning but also as a source of motivation, inspiration, and encouragement. The graduates felt valued, supported, and empowered to take risks and challenge themselves creatively, knowing that they had a network of peers to lean on for guidance and encouragement.

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4   CONCLUSION

This research paper has investigated the impact of Adobe Photoshop's AI Generative Fill on the creation of new graduate's product posters for their first external design exhibition, as well as the significant role of informal learning in developing designers' adoption of AI-driven design techniques. The integration of AI technologies into the design process represents a paradigm shift, offering new opportunities for efficiency, innovation, and creative exploration. The findings of this research underscore the proactive stance of recent product design graduates towards embracing emerging technologies. Despite the absence of formal instruction, the majority of participants independently sought out and utilised Photoshop's AI Generative Fill, demonstrating a keen interest in leveraging AI to enhance their design practices. This self-driven adoption reflects not only the students' adaptability and resourcefulness but also their recognition of the potential of AI to streamline workflows and unlock new creative possibilities. The informal learning environments, facilitated by social media platforms like TikTok and collaborative platforms like WhatsApp, played a crucial role in supporting the graduate's exploration of AI-driven design techniques. The supportive and collaborative nature of these informal learning environments empowered participants to navigate the complexities of AI-driven design with confidence and creativity.

The implications of this research extend beyond the immediate context of product poster design, highlighting broader trends in the design industry towards the integration of AI technologies and the importance of informal learning in facilitating designers' adaptation to technological advancements. As AI continues to evolve and impact various parts of the design process, designers must remain proactive in embracing these changes and leveraging them to enhance their practice. Moving forward, it is essential for design education and industry stakeholders to recognise the significance of AI in design and provide the necessary support and resources to enable designers to harness its full potential. This includes integrating AI-driven design tools into design curriculum, developing collaborative learning environments, and promoting a culture of experimentation and innovation.

Further research could evaluate the effectiveness of formal educational interventions in preparing design students for the adoption of AI-driven design tools. Therefore being able to inform curriculum development to better equip future designers with the necessary skills and knowledge needed to excel in a future technologically driven landscape.

In conclusion, the findings of this research underscore the transformative potential of AI in design and the critical role of informal learning in supporting designers' adaptation to technological advancements. By embracing AI-driven design techniques and fostering collaborative learning environments, designers can unlock new creative possibilities and shape the future of design practice.

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