A DESIGN AND AI COURSE: IN CONVERSATION WITH MACHINES

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ABSTRACT
This research is based on a course developed as a model automating the design process using Artificial Intelligence (AI) exploring its use of AI in the design process, its shortcomings, and its strength as a design tool. Much of the work generated in class by students were visual communication prototypes but lessons learned can be applied to other disciplines within design. Additionally, goals for the course were to produce a work pipeline for the design process which greatly shortens the concept development stage which allows for longer periods of evaluation of the content. Students were more critical of the results due to their assumed role as creative directors rather than production designers. This is a shift in roles for designers requiring more critical thinking that is clearly articulated in the AI prompt. Students edited prompts to build on the output, seeding the generator with their results. The rapport between student and generator was immediate, shifting toward clear communication in writing prompts and a much greater focus on ideas that were unexpected, and unique as well as those in line with the student's initial vision. A model for mapping the process based on the double diamond model, from the British Design Council was reimagined to include innovative processes and user testing to form three stages of divergence and convergence. Thoughtful discussions concerning the design process were particularly insightful challenging students who were familiar with current practices and those who were not but could leverage AI to write a design brief, craft innovative prompts, and critique potential solutions.

Keywords: Artificial Intelligence, design, education, curriculum

1 INTRODUCTION TO THE DESIGN PROCESS WITH AI
The course was developed as artificial intelligence and more specifically machine learning (ML) was posed to disrupt the process of design and reshape how designers would work with the technology. In its current form the resulting content is often viewed with scepticism for its ability to produce the exact image in the designer's eye. Some controls have been added to make edits in the three most used software in the class (Midjourney, ChatGPT (formerly Dall-E), and Bing) however, targeted edits that retain the rest of the image are not within the scope of these machine learning tools and if we understand probability theory it is likely they never will be. During the class students used the versioning tools and utilized the concept of recursive prompt engineering. The process has led to redefining our role as designers, which leaves production to machines, freeing up time for conceptual development and research before production and evaluation of a design's effectiveness through to postproduction.
The proposed process combines the innovation stages of the Doblin Group design process for innovation popularized by the Institute of Design in Chicago and the British Academy of Design's double diamond approach. Although, the Doblin process does emphasize research, seeking insights and evaluation of design it could not have foreseen the impact of AI on the process and in particular the variations of possible outcomes that generators provide. The proposed process for this class rebalances the thought process onto preliminary stages as well as testing stages. Within communication design, delivering an effective message requires a well-defined set of criteria and rigorous evaluation. These criteria are developed in these stages with a clear understanding of audience, context, and communicating a message. The first diamond frames our thoughts and lays the groundwork for evaluating and implementing the criteria.

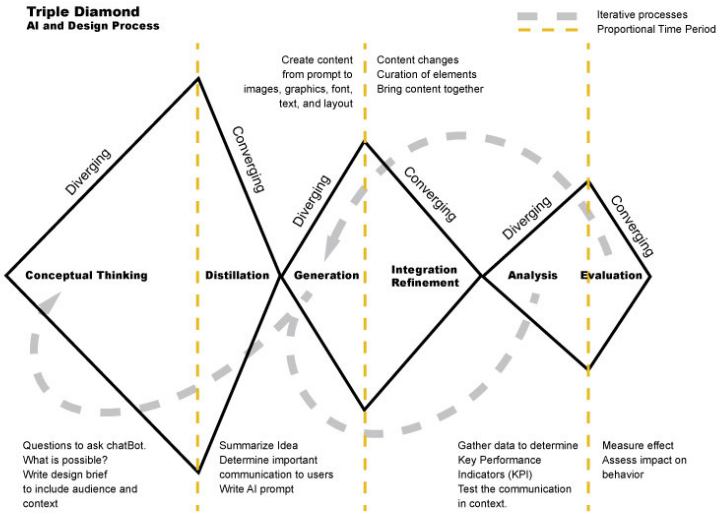

Figure 1. Triple Diamond Design Process – adding a third Analysis and Evaluation diamond. All three diamonds indicate time through pre, post and production stage

The proposed process combines the innovation stages of the Doblin Group design process for innovation popularized by the Institute of Design in Chicago [1] and the British Academy of Design's double diamond approach [6]. Although, the Doblin process does emphasize research, seeking insights and evaluation of design it could not have foreseen the impact of AI on the process and in particular the variations of possible outcomes that generators provide. Within communication design, creating promotional material for goods and services through images, graphics, and typography that all contribute to delivering the same message requires a well-defined set of criteria. These criteria are based on a clear understanding of audience, context and the message that communicate most effectively. The first diamond frames our thoughts and lays the groundwork for evaluating and implementing the criteria.

2 DEVELOPING A DESIGN BRIEF

In previous iterations of the class students used ChatGPT to generate a design brief with a simple prompt to include the subject and a few attributes of the product or service. ChatGPT understood the general framework of a design brief typically including these topics, executive summary, target audience description, project goals, budget, and deliverables as well as a visual language description. An evaluation section, and competitive analysis was often included in a single paragraph. These seven paragraphs were required, and each part of the framework was evaluated for specificity and correctness where possible and changes or inclusions to the brief were handed in. Demographic details were also verified for accuracy with references that could validate the generated text and fit the student's concepts. Prompt ideas were pulled from the brief so that a conceptual line could be draw from what was determined appropriate and accountable for future decisions. Establishing the process and the relationships between idea and evaluation of a decision making clarified the value of both the design brief and the prompts that led to the conceptual and creative generating.

3 DRAWING A LINE FROM BRIEF TO PROMPT WRITING

Prompt writing is an important part of the pipeline crafting subtle descriptions of a desirable output in which the text or image is described. The prompts used in class were self-generated meaning they were produced by the students rather than a text generator. Prompts for image generation are broken down into three parts; a general description of the content to explore, desired aesthetic qualities, and functional constraints for the output.

3.1 Descriptive prompts: prose, narrative, descriptive, detail

Students were encouraged to use adjectives to describe the project in the descriptive portion of the prompt. Other terms that describe themes, organization of the image as well as object details and environments improve results. How language is used can change the output of the AI and students were often referring to online dictionaries or thesaurus to find different terms in class discussions. Generally, this type of writing is direct but phrasing is also important in achieving not only the specific elements in an image but also stylistic characteristics to help convey the message.

3.2 Aesthetic prompts: style, artist, genre, effects, chaos, stylization

Much of the manipulation of imagery is based around stylistic qualities of the image which immediately indicate the boundaries of AI software. Because models are trained on images that exists online, its abilities are based on past qualities often described by students as 'limiting'. In part, this limit is due to their own exposure to style types and students were encouraged to use resource material such as Garner's Art Through the Ages [2], Doyle's, The History of Illustration, [3] The People's Graphic Design Archive [4], as well as AIGA annuals, gallery collections, and other diverse publications of imagery and design to remind and expand their repertoire. At the beginning of the course students produced hundreds of versions and variations of images they wanted to use but often would ignore the design brief requirements typically of the audience. A common defence of their work was, "I was just exploring ideas" which is what the first stage of the pipeline is intended however, it should be done communicating with the audience in mind. The converging stage of the second diamond is the most difficult for students because refining details into prompts comes down to a well-tuned design vocabulary.

4 IMAGE GENERATION, ITERATION AND REFINEMENT

Open AI's image generator built into ChatGPT provides an editor to produce variations of images as descendants of the first set of results. Using treatments at the end of the prompt such as effects, degrees of variation, and stylization can adjust the description of characteristics with additional parameters, like a sub-style. Adding an effect to an object for example, "a VW bus made out of mashed potatoes" (see fig 2) follows [object or scene] made from [material]. The prompt articulates the image like a Photoshop filter but with a much wider range of materials and visual effects. Still other style descriptors will produce not only image effects but also camera angle, scale and point of view.

Software such as Midjourney use a codified approach to tailor prompt writing. The term "chaos" and value pair are applied in combination with other aesthetic prompts to vary the image in interpretation within the prompt response. The values for Midjourney for example, range from 0-100 units of variation and provide fewer or broader conceptual results. Students were encouraged to use values over 75 to provide a greater set of interpretations in the conceptual thinking stage of the process. Once a direction was determined the image was used with the prompt in the refinement stage of the triple diamond. For example, "a VW bus made out of mashed potatoes in the style of Picasso - - chaos 10 - - stylize 20" will produce 10 units of variety with 20-units of influence of Picasso on the final output (fig. 2).

Figure 2 Using the prompt "a VW bus made out of mashed potatoes in the style of Picasso…" with different sub-styles in MidJourney.

Left: - - chaos 100 - - stylize 5" broad variation, photographic

Right: - - chaos 10 - - stylize 20" fewer variations, illustrative Arial 10pt, italic, centred, space before 6 pt, after 6 pt. Left and right indent 8 mm

4.1 Functional prompts: aspect ratio, resolution, image pass, weighted images and keywords, image filtering, camera/lens

Writing functional prompts relies on design knowledge to shorten the production time evident over the course of the class. Students took less time to develop prompts later in the semester and identified writing functional details in the prompt to speed their progress. Although not professional designers, the students had nearly completed their degrees and came equipped with some background using the functional constraints. These are considered functional prompts because of their direct impact on the output with less ambiguity in the values that are associated with the type of treatment. A chart of acceptable treatment and value pairs were provided to students for their reference. Many of the image generators have developed scripts with values to shorten the prompt text. For example, MidJourney uses --aspect or --ar for aspect ratio followed by the width and height values (--aspect or --ar 3:2). Only 7 ratios are available in version 5 which include 2:3, 3:2, 4:7, 7:4, 4:5, 5:4, and 1:1 which is the default. Any values can be added but the image will be set to the next closest ratio. Learning these values and their script was straight forward for students but the concept of weighting was new to most of them. Most generators will use inputs such as texts or images to seed the model and be 'inspired' by this input. Using a URL pathname to an image can be part of the prompt often with the '/image' script or in the case of Dall-E 2, it will prompt the user to input the URL. Using the - - iw (image weight) and range between 0-2 will add weight of influence on the final output based on the image input. Students reported little effect of the weight although changes did occur with a more nuanced affect.

4.2 Generating and evaluating content from the prompts

Students were introduced to the differences between contexts for text and scripted treatments which read differently than body copy for the same communication. For example, using the same type of prompt for the text to accompany the image on a poster may be as follows, "write a short paragraph describing a food sculpture competition using potatoes in the style of 1960's advertisement". The inclusion of the year 1960 as a specific style should have some connection to the audience but should also be included in the image generator prompt. Designing a communication ensures that the message is consistent across text, image, graphics and fonts as well as the way the page is composed. The resulting images are not cubist as one might expect from the Picasso style included in the prompt. Because the stylization value is low the images are less varied and therefore the selected style started on a literal path of 'cubed' and did not vary from that initial starting point. Typically, students and many professionals make these decisions intuitively or with little consideration other than it 'looks good' to them. Sometimes interesting contradictions occur creating novel results which does have value in drawing attention of the viewer. If this can be done in a more consciences manner it puts greater emphasis on the thought process because it must be articulated to the generator. It also removes some of the uncertainty that comes with design work holding designers more accountable evidenced in their prompts. We may see designers submit their prompts as part of the presentation given to clients or meetings within the design firm. Discussions in the class shifted from design quality to prompt terms and descriptions within the prompt. Most notably students would use references to genres and font families that had specific characteristics found in the prompts.

5 TESTING THE RESULTS, EVALUATING THE PIPELINE

During the last stage of the processes completed the triple diamond testing and evaluating the proposed designs with potential audience members. At this stage, students were asked to start from the beginning of the process with a new client and proposed communication with multiple touch points promoting the same product or service. This could be done using product tie-ins, or new communication materials in different contexts such as a movie poster, a 3D cut out for the same movie and its collector cup. Students reported that shifting from one generator to another was an inconvenience and proposed one software to locate all their work rather than fitting together the different parts of prepared material (design brief, prompts for each generator and assets for the project). Composition layouts were done using software enhanced with AI tools but required the students to actively contribute to the final designs. Each student found participants to provide feedback from simple split tests of three different versions of all touch points within the project. The participants were asked to compare individual products as well as the collection of tie-in items. An evaluation of the final design's effectiveness was not possible due to the limitations of the course and replicating incentives which better reflect user motivations. However, the

analysis of participants responses does provide some insight into their likelihood of purchasing or behaving because of the communication material.

The following questions and answers are from a survey given to all students of which 13 responded. They offer insight into how students who have completed the course now see the role of AI in the process, their work, and the industry. Comments similar in terminology and phrasing were grouped as well as sentiment analysis using text2data [7] for relevant question and compared to our assessment. The scale for the sentiment is ranked between -1 negative and 1 positive with neutral ranging from -0.25 to +0.25.

Question 1 - Describe the process you followed, how is it different from what you have done or knew before class?

The class is typical for a design course however, many of the students in the class are not design students in the contemporary sense. The focus of their program is directed toward print production and less on design concerns such as user-centred approaches and process driven strategies. All the answers were identified as positive using the text2data tool despite many of the students not having experienced a design course of this kind. “The process I followed for this class was a way more in-depth version of the design process I’ve used for other projects in the past.” (student 3)

Question 2 - What do you know about AI generators now that you did not know before?

Although the sentiment analysis appears to be generally negative (7 negative, 2 neutral, and 4 positive responses) the majority was a criticism students had of their own abilities to work with AI or their current understanding of how to design. “Something I pride myself in is being able to visualize something and then turn it into a physical design. All that pride was demolished in this class because rather than designing an image exactly how I wanted by combining various design elements I had stored in my head, I had to write each individual thought out as a prompt and hope AI saw my vision.” (student 7) The emphasis shifts to articulating what the student wants encouraging a thought process they previously did not exercise. “Unlike my usual method of visualizing and translating ideas directly into designs, I had to articulate each concept as a prompt for the AI, leading to extensive refinement through prompt adjustments. While this process was time-consuming, it provided valuable insights into phrasing and AI manipulation.” (student 13)

Question 3 - What was the most difficult part of the process or AI or solution you created for the projects?

Overwhelmingly, the issues students struggled with the most was writing prompts to get AI tools to produce what they wanted. Eight of 13 indicated writing or communicating to be the difficulty but made them think about describing their ideas in detail. The benefit using AI tools similar to a creative director not only encourages a clear vision but also managing the project throughout the process. The remaining 5 responses discussed issues with details or correcting small portions of an image. One student struggled with the design brief that was detailed enough for them to develop their prompts.

Question 4 - How do you see AI influencing or changing design in the future?

Of the students in the class there are three perspectives that formed around the idea of AI’s influence on design: diminished, mixed, and enthusiastic. Five students attempted to diminish the impact that AI would have and only saw modest advantages, “I don’t think AI will be able to change design overall since it’s reliant on existing concepts.” (student 3) Equally, five students hedged to admit AI’s advantages but suggested humans in the process would still be needed. This limited their view on the impact AI would have on the industry and their future career. Only three students were enthusiastic about AI and its ability to more than a human designer could do alone. They all stated it would take over the role of designer in the future. “I see it drastically changing design in the future, hopefully creatives will be able to embrace AI.” (student 10) Using the sentiment analysis tool, text2data [7] only 2 neutral, and 3 negative responses were found in question 4 with the remaining 8 identified as positive.

Question 5 - How would you change the process, pipeline or course to take advantage of AI more fully?

Most students focused on the course and the changes they would make however, a clear pair of concepts regarding speed of results, and frustration concerning their own ability to ‘talk’ to the AI generators arose. “a potential “workshop/playground” type of project at the beginning of the year could help new users of AI (such as me) understand what kind of images will be resulted from the key words that they are using,” (student 5) This translated into the projects being run too quickly but the pipeline was of value in understanding the designs they were creating more fully. “I would change the course by possibly including a small project utilizing the entirety of the design process at the beginning of the class. Then, throughout the course, learn and implement each of the steps of the design process more fully. Finally,

as is being done currently, incorporate the entirety of the design process AGAIN, but with a better understanding of each of the steps." (student 2).

One of the most challenging parts of teaching design is for students to be truly critical of their own work. AI boosts the willingness to do this because it puts the work outside of their personal space even though they are directly guiding the project. The process was perceived as a collaboration according to students, outsourcing some of the responsibility. More than half the class indicated they, "can be more critical because [their] collaborator has no feelings". All but 1 student reported a shift in thinking about the design process placing more emphasis on the user rather than the aesthetic qualities of the project in part because they perceived the output to be 'good or better quality' than they could produce. All the students reported the AI tools to be 'extremely fast' much faster than they can work. The overall efficiency of the process was reported to be 'slow' or 'average' in terms of getting the projects done. This may be due to the fact it is an unfamiliar process but with time could be shortened. All the students reported the process to be more thorough an investigation of the problem however, over half the students felt less satisfaction with the result indicating they disliked AI 'creating' the design with one student reporting a feeling of 'cheating' using the AI tools.

6 CONCLUSIONS

The integration of AI into the design process can enhance efficiency, clarify creative objectives and critical evaluation. Initially students faced challenges writing prompts, and they felt a loss of creativity autonomy, but by the end of the course they developed a more precise and critical approach to design. The incremental process of developing design with AI assistance enabled deeper understanding, and rigorous critique among students, highlighting AI's potential to transform design education. The evaluation of the design effectiveness was also new to students and revealing to their understanding of what design communication could and could not do. A more direct line connecting their thoughts to the interpretation of the audience was clearly drawn tying designers to the audience. By developing best practices for AI-human collaboration, we can further enhance both the educational experience and professional application of these fast-approaching technologies.

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