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THE BENEFITS OF HUMAN-CENTERED CONCEPTS IN STUDENT SKETCHING MEASURED WITH ARTIFICIAL INTELLIGENCE IMAGERY

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ABSTRACT
Traditionally Industrial Design students have used sketch visualization in creating product concepts for manufacturing or limited production runs. Students working to attain sketch visualization as a skillset often find hand sketching to be a far more difficult than they had hoped. Despite this difficulty, coursework on sketch skills in design education has been on the decline. Add to this the need to depict human figures to support storytelling as part of solving human-centred design (HCD) problems. With the rapid advances of Generative Artificial Intelligence (AI) to create concept imagery that include human figures, are new opportunities with generative AI technology are becoming an enticing tool for designers. AI is potentially attractive to students who have not developed sketch visualization skills, and when they rely on digital sketch skills a feeling of under confidence manifests. Concept imagery through AI is powerful in realism, but are the user emotions & actions at the core of HCD possible in AI? This brings the question for this paper: "Does the use of Artificial Intelligence provide concept imagery for a human-centred approach supplant students hand sketching?"

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1 INTRODUCTION

Sketching concepts, often referred to as 'visualization,' is considered a hallmark skill of Industrial Designers critical to ideation. Traditional sketching with pen to page has felt a powerful influence of sketching digitally on tablets and now the even more powerful are the possibilities of Artificial Intelligence. Digital sketching combined with an educational shift has had an impact on traditional hand sketching with universities decreasing its role, and showing a decline in drawing abilities.(Fava, 2019) Yet strong traditional sketch basis remains invaluable to generate confidence, confidence for exploring ideas and for personal esteem (Van Passel and Eggink 2013) Sketching by means of traditional pen, pencil, and marker has translated into digital sketching that designers have seen as a powerful tool accompanying haptic sketch modelling (Evans et al.2015) These digital technologies have expanded the opportunities for most designers when applied to expand upon traditional skills. However, skipping traditional sketch skills in curriculum has led to a decline in the abilities and slowed ideation with weakening quality, causing frustration in the need to constantly repeat 'undo' command during ideation. Some industries however have embraced digital concept creation suggesting traditional skills as not essential. (Fava, 2019) Other digital technologies for sketch visualization has been exploring the possibilities of Virtual Reality. (Joundi et all 2020). The impact on traditional sketch skills to visualize is compounded by new needs in sketch skills for design. With Industrial Design problem solving by means of Human-Centred Design (HCD) approach many aspects of the problem may be solved in ways without the traditional product centric approach. This expansion beyond products has resulted in another a gap in sketch skills, the ability to draw the human figure effectively. To meet the needs of human centred design, human figure sketching needs depict emotions, profession, gender that portrays a better sense of storytelling while still being fast (Scully& Sypesteyn, 2023) Concept imagery through digital AI is powerful in realism, posing a slick quick alternative to sketching. But are the concepts that account for user actions and emotions at the core of HCD possible in AI without sketching? (Figure 1) This brings the question for this paper: "Does the use of Artificial Intelligence provide concept imagery for a human-centred approach supplant students hand sketching?"

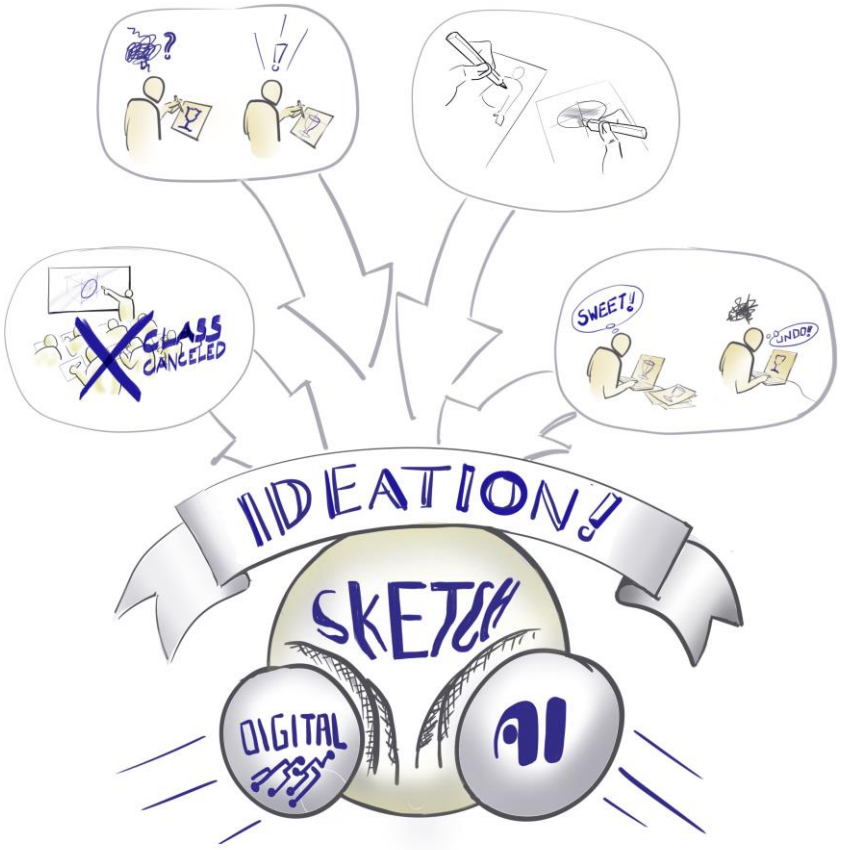

Figure 1. Forces on Sketch Ideation

2 ARTIFICIAL INTELLIGENCE

Explosion of industry to participate in generative AI shows no sign of slowing affecting ideation in design and getting accolades for its rollout (Fast Company, 2023) Insiders also see its benefit to the design process. (Noguera, 2023) and new courses dedicated to AI in design are suggesting an enhanced design process. (Dezeen 2024) (figure 2).

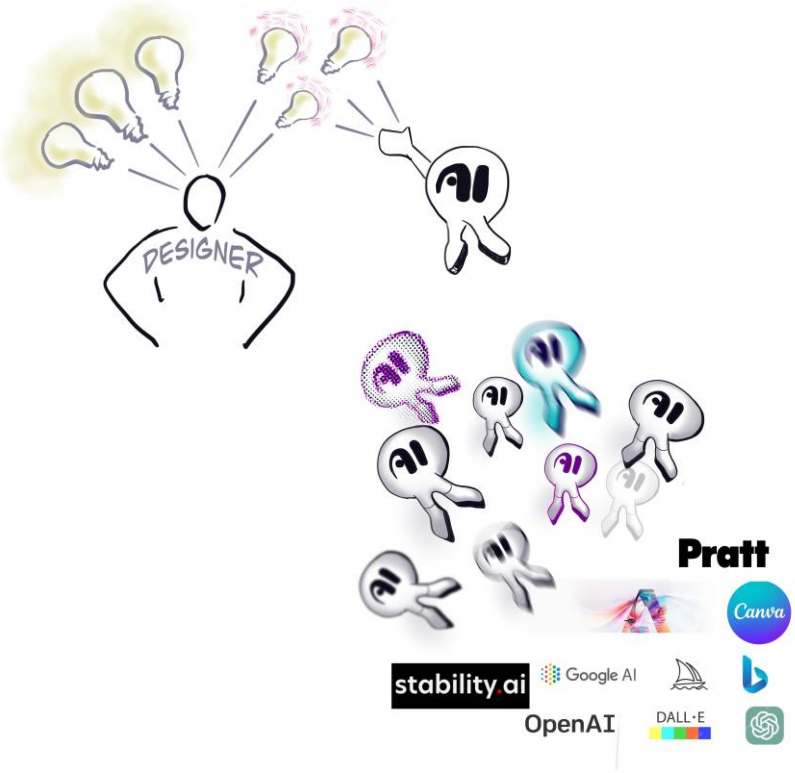

Figure 2. AI for design

2 STUDENT PROJECT

2.1 Project Playscape

Second year undergraduates were tasked with concepting for a ‘playscape’ and empathize with stakeholders for HCD. starting with a with a brief tutorial on sketching simple human figures, students they were asked to ideate with actions feelings and interactions they wanted the users to experience, noting the value of storytelling (Parkinson & Bohemia 2012). (figure3)

Figure 3. Students sketch ideation

2.2 Use of AI

After sketch concepting stage students engaged AI visiting Bing.com powered by Dalle 4. Using one sentence word prompts they generated playscape concept imagery that included human figures in action. (figure 4) Often the images created by AI contained small figures helpful to show scale and actions such as running, climbing, & sitting. Some AI figures were mocked by students as they appeared to be falling, screaming, or with malformed limbs. The AI images contained impressive consistency in colour, rhythm, lighting, and whim- sical and fantastical environments. (figure4)

Figure 4 examples of AI produced imagery

2.3 Sketching vs AI

Having sketched human figures in playscapes ideation, then AI for further ideation, students participated in a questionnaire. The questions posed in of Likerts scale of "not valuable to 'very valuable' of hand sketching compared to AI establishing the perceived value of ideation and HCD (figure 5)

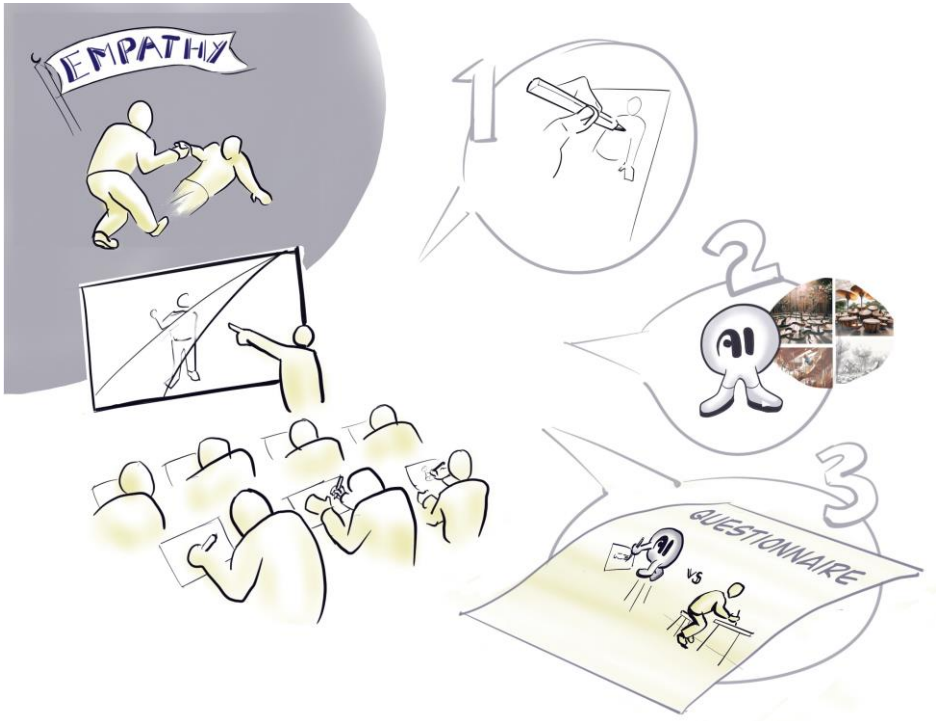

Figure 5. Students sketch ideation

3 QUESTIONNAIRE

The pages below show the content of questions (figure 6) The chart (figure 7) shows dark areas (in purple) where hand sketching is perceived as valuable over AI for: ideation, and HCD in empathy, actions, emotions, age & gender depiction.

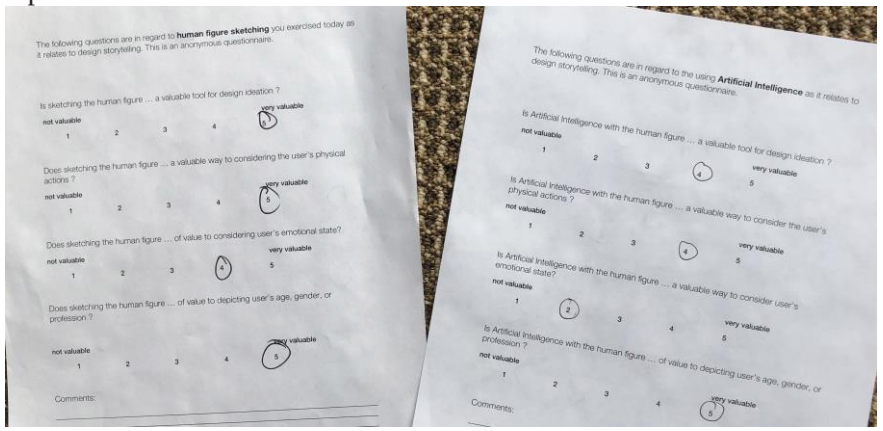

Figure 6. sample pages

student #	Q 1: ideation sketching	Q 1: ideation AI	Q 2: physical actions sketching	Q 2: physical actions AI	Q 3: emotions sketching	Q 3: emotions AI
1	5	3.5	5	4	5	3.5
2	5	3	4	2	3	2
3	4	2	4	2	4	1
4	5	3	4	2	2	1
5	4	2	5	2	4	1
6	5	4	4	1.5	2	2
7	5	3.5	5	2	5	2
8	5	4	4	4	4	2
9	5	3	5	4	3	4
10	4	5	5	5	3	5
11	5	4	5	4	3	2
12	3	4	4	4	3	2
13	5	4	5	5	4	2
14	5	4	4	2	3	1
15	5	3	5	1	4	1

human sketching better than AI
human sketching more than 1 point over AI

Figure 7. chart of questionnaire highly favouring hand sketching

4 DISCUSSION

The students polled showed 82% favorability to hand sketching over AI in ideation, human figure actions, and emotions. Written comments in the questionnaire made mention of the perceived shortcomings of AI for HCD. (figure 8)

Figure 8. student favouring their own sketching

5 CONCLUSION

Sketching and AI will both have a roll in ideation, but in this limited qualitative survey students felt much more strongly toward their own sketching despite their weak skillset. While students highly approved of their own figure & ideation, the mediocre quality of their sketches did not seem to play a role. Moreover, students failed to take advantage of AIs expressively rich visual environments AI produced in favour of their own feeling theirs feeling empowered buy human centred directions. (figure 9)

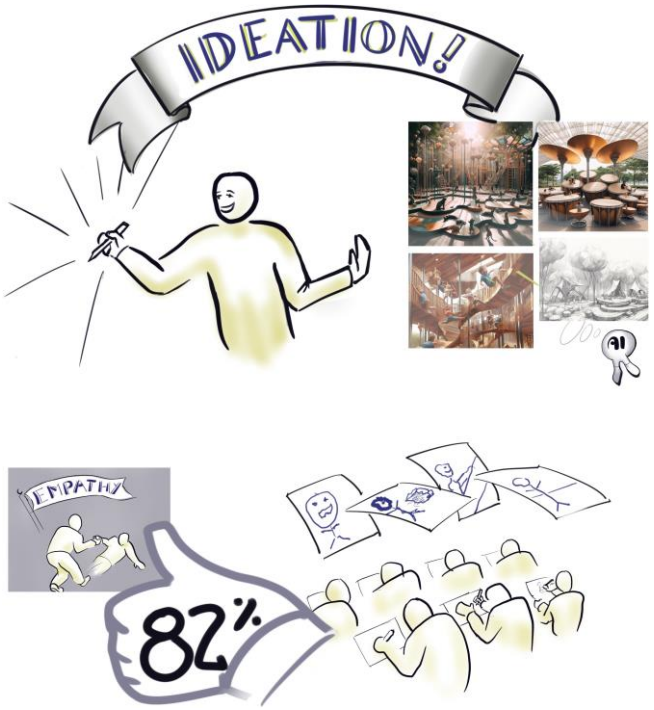

Figure 9. students favoured sketches and ignoring the strengths of AI

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