

THE HOT INDUSTRIAL DESIGN SKETCH: PERPETUATING THE DOMINANCE OF THE MALE INDUSTRIAL DESIGNER

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ABSTRACT

Female industrial design students are not moving forward into industrial design practice. In education there is equal representation of men and women, however, women make up only 19% of the industry. We hypothesise that the industrial design style of sketching and the idolisation of the “Hot Sketch” has contributed to this disparity. A large part of industrial design education is dedicated to learning this style of sketching and is a critical skill set to show in order to enter the industrial design profession. Students who struggle with sketching are told to spend more time practicing alone after studio hours. We hypothesised that males at Iowa State University have more sketching skills than women, and that the industrial design sketching style has been equated to confidence, while the fine art style is typed as hesitant and unsure. This paper presents a research study conducted at Iowa State University showing the differences in men and women’s learning outcomes, perceptions of ability, and confidence in the industrial design sketching style. A survey and sketching assessment of the entire student body was partnered with semi-structured interviews to further understand the specifics of this gap in sketching ability, how students learned to sketch, and how student perception of stylised sketching effects their ability to learn this skill set, and subsequent progression into practice. We investigate the disparity in women’s sketching ability versus males, partnered with the perception of sketching styling, and how this may lead to women being seen as less knowledgeable, and males dominating our profession.

Keywords: Industrial Design, Sketching, Gender, Design Education

1 INTRODUCTION

Industrial Design students enter education believing the pedagogy is built to serve the needs of all students regardless of previous learning experiences or gender. However, schools of industrial design have equal ratios of male to female students, but professional practice is merely 19% female [2]. Other disciplines that face this same scenario (such as architecture and engineering) are producing research on this topic, but the same is not happening at the same intensity in industrial design. Through understanding where females are struggling in their industrial design education and how their skill sets differ and are perceived by their peers and instructors we can begin to understand where the shortcomings are in their education and can address the pedagogical gaps, which lead to less participation of females in the profession.

2 BACKGROUND: LITERATURE REVIEW

When women are missing in industrial design professional practice, it has consequences for not only women in the field, but for industry [5]. The tacit knowledge of women is integral to the design process not only for women’s products, but also for overall innovation. Homogeneous teams have been shown to be less innovative, even when the skill set of the homogeneous team surpasses the heterogeneous one [14].

The lack of diversity in industrial design will only hold back creative thinking among design teams, and optimal gender representation is 50/50 for proficient innovation [15, 16, 17]. When teams are

diverse, they bring in different spheres of influence and life experiences. This can lead to disagreements and contentions because of differences in opinion and life-stance, but filtering through those arguments and using those as an advantage to the design process is what fosters further creativity and innovation for the entire team.

In the 1980's, Bruce found that UK design managers noticed that women weren't putting themselves out there and applying for jobs [5]. She speculated that the terms of industry ("industrial, mechanic, technical, manufacturing") have underlying masculine tones to them and can inherently bring male dominant atmospheres into the profession [5]. Bandura's theory of self-efficacy explains that when someone doesn't see themselves succeeding in a task or see their skill sets as successful, then they will be less motivated to continue working on those skill sets. If an individual doesn't feel they fit into the mould of the skill set or realm they are working in, they may not have the self-efficacy to continue developing the skills necessary for that work [18,19]. When women are a minority in our field, they feel as if they have to prove themselves, working harder to be taken seriously on projects. When these women saw other women in leadership, role models, and someone to look up to, it helped them stay motivated and encouraged [1].

Women have lower spatial skills than men, and in first-year engineering students, it was investigated that the reason women were dropping out could be due to this phenomenon not being allocated for in pedagogy. If women were struggling, while their male peers were seemingly breezing through material, Sorby presumed that this leads to a lack of women continuing in their engineering education [21]. Combining Bruce, Bandura, Sorby, and McMahon's work, we were curious what the specific barriers to access women were facing in their industrial design education. We hypothesised that student's ability in several core industrial design skill sets and women's confidence in those skill sets were a part of the reason we see a massive lack of female representation in our industry. As presented with the literature above, this topic is extremely complicated and encapsulates several aspects to studio culture, interpersonal interactions, multiple skill sets, and pedagogy. The sketch and render in academia is represented as an astute understanding of form and material, how light and shadow operate on form, and renders to go immediately and clearly into a 3-D CAD model [20]. Although there are many factors attributing to the lack of women in industrial design and many possibilities for each individual's success or struggles in industrial design sketching, we hypothesised that cultural factors of the design studio and pedagogy lead to an inequitable experience for women learning sketching.

3 RESEARCH METHODS

The lack of previous literature and data regarding the skill sets of industrial design led us to perform straightforward assessments of sketching abilities in order to see if there was a difference in how current sketching pedagogy is or is not meeting men and women's needs at Iowa State University, to inspire cross-institutional investigation. Our first goal was to assess whether women were reaching the same standard of sketching as men. In order to study this, we gave students (n=97) a packet instructing them to design a new vacuum through sketching. A vacuum was used as the product to sketch due to its complex compound surfaces with multiple parts and this would show a student's ability to effectively render it using our sketching assessments. Students were given 5 minutes for ideation and 10 minutes to produce the final product. Afterwards, our team analysed the sketches on a scale of 1-5 (1 being the lowest and 5 being the highest) on each of the following aspects of the sketch: line weight, correct perspective, shading, feature callouts, compound surfaces, and ideation process.

Informal, semi-structured interviews (n=12) were conducted with an equal number of male and female fourth year industrial design students from our institution. These interviews were collected for qualitative general understanding and synthesis with some specific quotes for further understanding of what students are truly learning and experiencing within our programme both generally and in sketching specifically. It was critical that student's positive and negative experiences were recorded in order to understand what the barriers are for students succeeding in industrial design education.

Surveys were also conducted with all levels of the Industrial Design student body at Iowa State University (n=107) investigating student's perceptions of their industrial design skill sets and confidence levels. The findings from these qualitative and quantitative investigations show common themes regarding the perception of women's confidence levels in the programme and how sketching ability and style shapes these perceptions.

4 FINDINGS

The research reflects the unproved anecdotal notion in industrial design academia that men are better at sketching in the industrial design style than women. This was shown through the sketch assessment, survey, and through the interviews.

4.1 'Hot sketch'

The findings from our sketching assessment – to see if there was a real differentiation in skill sets related to gender proved what instructors and students had perceived, at Iowa State University there is a difference in sketching ability in the Industrial Design style based off of gender. A Pearson chi-square test of independence was performed to examine the relation between gender and the final score of the student's sketches. The relation between the variables was statistically significant, $\chi^2(2, N = 96) = 5.316$, $p = 0.021$, with a phi value of -0.235 , indicating a negative weak association. The upper quartile (75th percentile and above) was comprised of 22 males, while only 3 females. In assessing the sketches further, we found that even these top female sketchers were not to the calibre of skill that their male counterparts were, as seen in Fig.1.



Figure 1. Top Student Sketch Samples, Female and Male Comparisons

4.2 'Women aren't as confident'

Through our interviews and survey we found a link between our industrial design females not being confident. We also found that students perceived the style of industrial design sketching as confident and the fine art style of feathering as unconfident and unsure. In these interviews, when asked about sketching, men said that they preferred the traditional industrial design sketch style to the fine art style, while women said they preferred the fine art style since it communicated to them. Five out of six males had experience prior to their industrial design education with either cartoon style drawing or illustrative style drawing, while all of the women had experience with a fine art feathered style of drawing and no experience with either a cartoon style or illustrative drawing style. This is significant since cartooning has an aesthetic similar to the industrial design style of drawing, and this experience with cartoon or illustration style is close to the industrial design sketching aesthetic and could potentially have an effect on the success of students in the industrial design programme.

All male and female students strongly perceived the industrial design sketching style communicated confidence while the fine-art style sketching communicated hesitance and someone who was not confident in their ideas. Both male and female students commented that the women overall were less confident in presenting their work, which lead to students viewing them more sceptically than their male peers. Female students were also less confident in showing their sketches during peer reviews and were less confident in their success in the industrial design programme at Iowa State University.

From our interviews we found the consistent feedback provided to students, male and female, is that in order to increase their sketching ability they need to put in the time outside of the classroom and

practice, but if students were starting without any understanding of the industrial design sketching aesthetic and no background in the cartoon style or illustration style of sketching this felt futile. As one student commented “I would sketch outside of class and see no increase in ability, I didn’t know what I was trying to get towards, and like I was just drawing to draw and didn’t know what I was supposed to be learning from it, so I just backed off from it.”

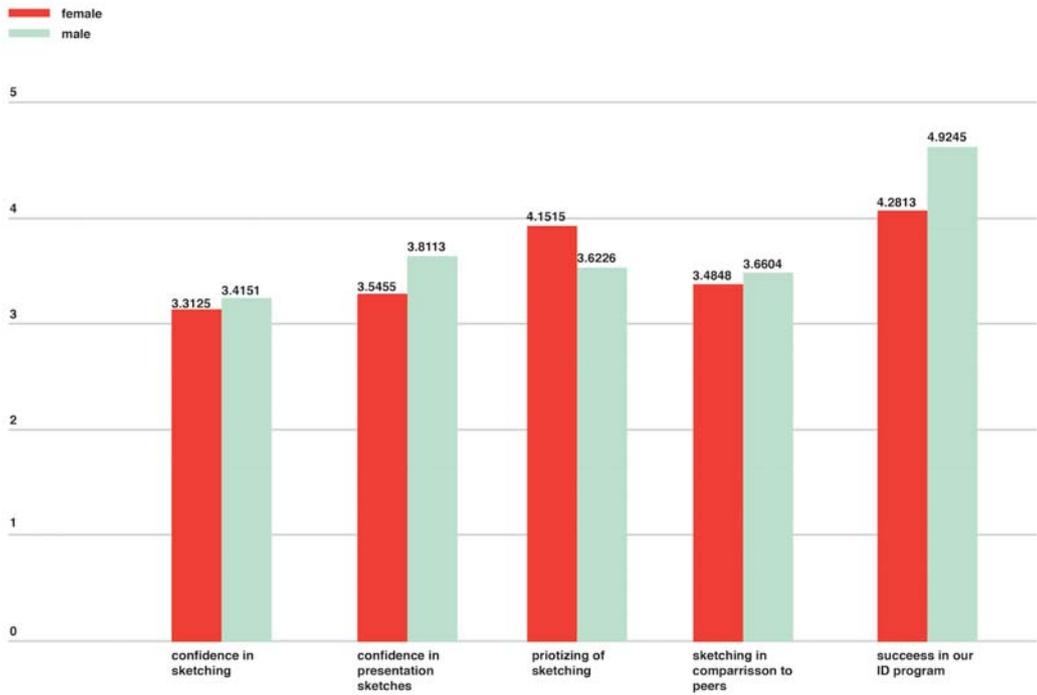


Figure 2. Confidence Levels comparing Men & Women in Industrial Design



Figure 3. Perceptions Industrial Design Sketching & Confidence

5 DISCUSSION

Looking at the data from student’s sketching skills, it is clear that women at Iowa State University are not learning this primary skill set necessary for entry into the field of industrial design at the same level as their male peers. All of our research consistently brought in the levels of confidence, the

confidence of students presenting sketches in front of peers, or the confidence in which a drawing style communicated itself. The consistent reference to “industrial design sketching looks confident” becomes a reference point for women to reflect on their own ability to perform in the classroom. Students also consistently equated the ability to sketch in the Industrial Design style with working harder and being a better designer, so instead of looking at what the root cause is for disparity between men’s and women’s skill sets those who are unable to sketch in that style are labelled as lazy and uninterested in participating in the field.

With these statistically significant results, this indicates a need for further investigation into how specifically this is happening. Further investigations should include inquiry into the following: if this is related to gendered drawing styles in early childhood, if the curriculum of sketching is gendered, and/or if our instructors in industrial design are teaching students in a gendered manner (i.e. communicating with students in a way that is naturally comfortable for male students, but not female students).

After analysing our student interviews, we found that female students don’t prioritise sketching in the Industrial Design style as much as male students, and view it as necessary as males do for entry into the field. This brings to question whether this style of sketching doesn’t relate to feminine characteristics, how sketching is instructed, what do students think are the core skill sets for entering the field of industrial design, what are the critical skill sets for entering the field, and most importantly, are women seeing themselves as able to be a part of the discipline.

This last statement goes back to the literature Bandura produced theorising that if someone doesn’t see themselves fitting into skill set skill set, or don’t perceive themselves as skilled in that specific task, they are less likely to work on that skill and pursue it [18,19]. This study does not directly show this correlation, but from comments in the interviews discussing a feeling of futility and a perception of a lack of growth from sketching alone after hours, it is something to be investigated further in the future.



Figure 4. Examples of Impact of ID Sketching in Studio and Education

6 CONCLUSION

This study found that women at Iowa State University are less skilled in terms of sketching in the industrial design style, and have had entirely different experiences in their education that males were not experiencing. The results from our study show the need for further study comparing other schools and institutions to see if the results correlate. The investigations should initially remain within sketching skills and then should also broaden to include other core industrial design skill sets. Having a quantifiable understanding of women in industrial design education’s skill sets from a broad range of institutions will assist in understanding what makes an ideal learning environment and pedagogy for both women and men to learn sketching and other industrial design skills in order to increase the number of women industrial design students entering professional practice.

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