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Gendered Pathways in Design Education: Findings from a Public University in India

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Abstract
The substantive aims of education include equitable learning, which stands for equitable gender access to preferred learning and choice within. These substantive aims can be furthered by pursuing certified vocational courses that equalize the presence of males and females in the job market through competitive skill sets. Design education in India was imagined as a composite field encompassing both technical studies and social sciences, and it was concentrated in metropolitan cities and technical institutions. It has now slowly spread to newer cities and more disciplinarily diverse institutions. Our research posits that the current unstructured growth of design education leads to a lack of emphasis on substantive outcomes. Rather, there is a focus on education for the sake of acquiring a certified competitive skill. We further analyze the distinction that has emerged between 'industrial' and 'communication' domains within design. This distinction is visible in the twinning of industrial design with engineering and architecture, while communication design is seen closer to fine arts and aesthetics as a stream not requiring technical expertise. This perception has precipitated a trend of gendered pathways in design education. This study used an exploratory approach to analyze five years of admissions data from the design department of a public university in a Tier 2 town in India, followed by semi-structured interviews with students and alumni. We found evidence to support the thesis of gendered pathways, attributed to factors like conventions of society, perceived safety, learning styles, curricular expenditure, and course briefs.

Key Words
design domains, hard and soft design, technical education, design education, gendered domains

Introduction
The last two decades have witnessed a steep growth in the number of design education institutions across big and small cities in India, with the current number estimated at 1000+. Design education in India has been twinned with technical education since its advent in the 1950s. Evidence suggests that design and technology education have been one of the most gendered disciplines in advanced economies (Harding, 1992; White, 1995; Findeli, 2001). Developing economies like India are being seen to follow similar growth trajectories and similar persistence of inequalities (Chu et al., 2015; Parmar and Modi, 2017).

Within design education, industrial design and communication design have emerged as the two dominant disciplinary subsets. This duality has emerged, perpetuating a 'hard' and 'soft' design dichotomy which is visible in the categorization of the two subsets as 'soft' design, encompassing communication design streams like graphic and service design, and 'hard' design,

pertaining to industrial streams like product and automobile design (Clegg & Mayfield, 1999; Findeli, 2001). Existing research in the G-20 economies observes that women are under-represented in what they refer to as 'hard' design areas such as product and furniture design and over-represented in 'soft' design areas such as fashion, jewelry, graphic and service design. They identify this polarity as a platitudinous correlation of females with the body and decoration, and males with technology and shaping (Clegg et al., 1999). There is also a distinct difference in the terminology used for learning outcomes in the case of these areas; 'hard' areas use more technical and systemic terms while 'soft' areas use more artistic and user-centered terms.

Our study was conducted in a public university to uncover the gendered pathways in design education in India. We looked at student enrollment data like socio-economic background, discipline choice and placements to determine trends in the design department during the student's four-year academic journey and subsequent career. We support our statistical findings with semi-structured interviews with students and alumni. Our aim is to add to the scarce literature on gendered access and capability witnessed in the design education space in India. This research can help contribute to gender access literature and, in turn, help highlight the observed barriers to equitable design education in India. It is essential to empower students to creatively assess their own potential and map future professional pathways. Herein, student empowerment is defined as 1) having access to preferred design courses, 2) having the choice to pursue the preferred design course and 3) having the technical ability to pursue the course of choice.

Design is a field that has been predominantly seen as a gendered feminine or feminizing domain, but, as our study shows, it is still a male-dominated field due to unaddressed issues of social perception and perpetuated gendered discipline choices that have infiltrated design curricula from technical education streams such as engineering and architecture. In this paper, we also argue that the persistence of divisions, both gendered and otherwise, in design education is not conducive to innovation and the building of open knowledge systems in a nascent discipline by presenting evidence of problematic perceptions in vocational design education in India.

Within the scope of this paper, we have used the term 'design education' to refer to design as a taught discipline, with formal education in design methods, distinct from fine arts, crafts or technical education (Balaram, 2005). We use the term 'design discipline' to refer to the two large disciplinary monoliths within design education, i.e. communication and industrial design. Further, we use the term 'design stream' to refer to a specific sub-discipline within design, such as graphic design or service design. We have used the 'hard' and 'soft' design thesis first proposed by Clegg et al. (1999) to better understand the gender divide existing within the study of the discipline of design in India. We start the paper by reflecting on design education in India. Next, we share the theoretical underpinnings of this research and describe the methods we followed. We end with reflection on some of our findings and the possible implications.

Background

History of Design Education in India

The advent of formal design education is usually attributed to the Bauhaus school in Weimar that defined the philosophy and ethic of industrial age design from 1919 to 1933. Bauhaus was shut down by the Nazi regime, but the faculty and students migrated globally, setting the agenda for design education. Set up after the First World War, Bauhaus idealistically strove to balance industrialization & mass production with artistic vision and individual expression. Even then, the institute was beset by embedded socio-political hierarchies, further exacerbated and explained by the broader crisis in patriarchy after the First World War where the notion and appearance of being strong and masculine were constantly bandied about with the background of European political turmoil (Ray, 2001).

Vocational design education in India was influenced by the pedagogical developments in Europe, thus embedding a complex history of exclusion of females and minorities (Natarajan & Chunawala, 2009). In India, until the '50s, the craft and design tradition largely stayed outside schools, and vocations were determined by castes and lineage. Artisans trained through family apprenticeship in the largely patriarchal communities (Balaram, 2005; 2009). British colonists reinforced the idea of certified knowledge (Vyas, 2006). Post-independence in 1947, an industrial vision led to the Kothari Commission in 1966. It linked education to productivity and gave importance to science education, work experience, and vocational education. The Indian Institutes of Technology (IITs) were set up as part of this imperative. The National Institute of Design (NID) was the first Design institute, set up on the recommendations of Charles and Ray Eames. They amalgamated the strong Indian craft and design legacy with skills needed for contemporary industrializing India (Eames, 1958; Vyas, 2006).

Socially, India has many divisions of region, race, language, caste and gender that are also reflected in higher education access and enrollment across population groups and geographies (Natarajan & Chunawala, 2009; Nath, 2014; MHRD, 2021). Focus on gender and minorities was not an explicit concern in vocational education in a fast-industrializing India until the late 1990's, when issues of gender-equitable education first appeared in the Indian planning space. Even after that, the focus was on access itself rather than gendered pathways within technical disciplines like design that were precipitated by historical structural differences.

Gender in Design Education

The annual All India Survey of Higher Education (AISHE) (MHRD, 2019) has consistently highlighted the disparity in gender enrollment issues in higher education, especially technical disciplines like engineering and architecture. Design is included in these categories. Existing design education research relies on management theory for analyzing the gender divide in discipline choice in males and females (Matlow, 2000). The "hammer problem" postulates on why women do not choose disciplines perceived as 'hard', because of a perception that they lack the skill on account of being a woman. So, the hammer requires strength beyond what a woman is capable of. Reassurance does not assuage the underlying sense of inability (Clegg, 1999a). This stems from the socio-technical construct of competencies. Further, gender relations in technical education have been theorized as 'guest' and 'host' where men are hosts and women are guests. The 'host' position puts constraints on men to be seen to perform,

while women's 'guest' status gives them relative freedom, but dominance is mistaken for competence and vice versa (Elkjaer, 1992).

The research that has emerged on the connected issues of gendered preferences in technical design education largely comes from American and European studies (Clegg 1999a, 1999b, 2001; Auf der Mauer et al., 2004; Mayfield, 2009; Sequeira, 2012, Williams et al., 2018). This research area has remained largely undeveloped in India, where the spread of technical design outside the few premier institutions like the IITs and NID is a recent occurrence, coinciding with the spread of design education in India in Tier 2 and 3 cities (Dhaundiyal & Dhaundiyal, 2021). Cities in India are classified as Tier 1, 2, 3 and 4 based on population density (MoHUA, 2021), with Tier 1 being the most densely populated. Within this research, analysis of barriers and opportunities to equity in higher education institutions in populous urban centres in Tier 2 and 3 cities takes centrefold. There is a large presence of higher education institutions across Tier 1 cities, but with growing demand, Tier 2 and Tier 3 cities have an increasing number of institutions as well now (Parmar & Modi, 2017). This extends to design education as well. Thus developing this area of knowledge stands to offer correction and insight into the equitable distribution and development of design education in India, where technical education between genders remains largely and highly skewed in favour of males. Tier 2 and 3 cities with design courses need interventionary policy guidance to maintain gender balance and remove observed 'hard' and 'soft' design bias in established Tier 1 centres such as the IIT's where, even though design departments exist, gender participation remains highly skewed in favour of males (Mansuy & Henderson, 2021). However, research from India in the area of equitable pathways within design studies remains scant, leading to a perpetuation of categories of exclusion.

Creation of Categories of Exclusion

The perpetuation of categories of exclusion within design education has strong historical and structural roots. Learning styles are dependent on experience, observation and one's conceptualization of the world, all of which are influenced and shaped by gender (Chou & Wang, 2000; Brew, 2002) e.g. a strong differentiator is the difference in learning styles of design students in relation to their academic performance and gender (Mainemelis et.al., 2002; Cassidy, 2004; Demirbas & Demirkan, 2007). These differences in learning styles form at a very young age (Sarr-Ceesay, 2000). Studies in both, school education (Chu et.al., 2015) and higher education (Stirling, 2007; Miske et.al., 2010) have found evidence of strong gender influence on learning styles and course outcomes. This has been found true in creative disciplines like design and architecture as well (Kvan & Yunyan, 2005). Gender is also a strong influence in the eventual selection of vocation (March et.al., 2010; Chu et.al., 2015).

Selection of vocation has also been attributed to gender competencies and 'incompetencies'. Various theories have been utilized to justify the possible roots of women's 'incompetency' in technical design areas (Nurhaeni & Kurniawan, 2018). The Human Capital Theory describes how voluntary life choices are made in allocating time and effort to tasks such as work or family. This theory suggests that because persons involved in labour-intensive tasks such as childcare and housework tend to select jobs that are comparatively less demanding. This theory thus predicts that because less effort and time is devoted to the job, there are fewer positive performance outcomes such as pay or promotions (Satterfield et al., 2010). The Sex Discrimination Theory focuses on the idea that men perceive women as a child rearer, and as such, it is appropriate to

scale back their work duties and outcomes accordingly. Both approaches of describing the effects of family responsibility on job performance suggest that family responsibility has an adverse effect on work effort, particularly for women. This limits women's opportunities for positive performance outcomes such as merit increases and promotions (Lobel & St. Clair, 1992; Reskin & Bielby, 2005; Marlow et.al., 2009).

Studies have looked at the 'barrier' model that reviews existing and potential barriers to females in technical education and flagged factors like STEM inputs in school, occupational environments, and lack of role models and networks that lead to passively made alternative choices (Mishra et.al., 1999; Siann and Callaghan, 2001; European Commission, 2002; Wonacott, 2002). It was also found that often students themselves are not explicitly aware of gender disparities in access and choice in higher education but identified implicit issues like intimidatory behaviour and gender stereotypes in learning (Thurtle et.al., 1998). Research in gender differences in information technology attitudes, use, and skills among students found the learning gap was narrowed when using IT enabled methods that bypassed the deep-rooted biases ingrained in conventional methods (Blurton, 2001; Stepulevage, 2001). This has been found true in vocational education as well (Nestler and Kailis, 2002).

It has been seen that even though the opportunities for females in technology education have increased, many still choose not to pursue it due to their perception of technology education as a male domain (Zuga, 1999). So merely providing opportunities is not enough without addressing the structural issues that affect choice and decision making. The answer for lower female enrollment in technical design courses, however, cannot be reduced to the above biased theories. Looking at multidisciplinary data is one possible approach to analyzing why the technical design gender bias exists and how it is perpetuated.

Methodology & case study

Our study is based at the (XXX University) which offers specializations in product design and graphic design. The city XXX, where the University is located, is a Tier 2 city with a substantial student population from surrounding Tier 3 and Tier 4 urban and peri-urban centres. XXX has many regulated and unregulated private design colleges. Our primary data was collected at XXX University, a state government university running seven technical education schools, including design. The application rate within the School of Design has been steadily increasing, reflective of increasing interest in design studies across the city and the state. The city and its educational establishment are representative of design education development patterns across many Tier 2 and 3 cities across urbanizing India. While exact data on the number of design colleges and departments in India remains absent, the positioning of the city and its design education institutions does allow for a degree of generalizability in design education patterns.

The four year design programme at XXX University is structured as a common one year long foundation course, followed by three years of specialization in a particular stream. The two streams offered are product design and graphic design, based on the conventional disciplines of industrial design and visual communication in design education. As taught in the university, product design relates more to design of 3D objects and physical form while graphic design relates more to visual communication in both digital and print media. The department has a limited intake of 30 students per year, with entrance through a national aptitude test. The

average selection ratio is 1:6. The department is part of a public University with affirmative action based seat reservation as followed by the Government of India for marginalized communities, however, this data was not analyzed as part of this study.

The study analyzed two sets of data. The first set consisted of enrollment data from five years of University admissions, taken from registration forms after removing all identifiers. The sample population included all enrolled students in the design department from 2015-2020 between the ages of 19 and 26, some of whom have now graduated. We analyzed data on gender, city and area of residence, parents' employment status and family income brackets.

The second dataset was derived from semi-structured interviews conducted telephonically on account of the COVID-19 pandemic. Non-purposive sampling techniques were deployed to select students as respondents. We sent a recruitment email to five randomly selected students from each batch, and 12 confirmed participation voluntarily and gave informed consent. The number of respondents was equally divided across communication design and industrial design. There were seven females and five males. Only gender, age and discipline were recorded as identifiers for respondents. The language used was primarily English, with some Hindi words, translated for coding purposes. The telephonic interviews varied between 20-30 minutes, following a semi-structured approach. We audio-recorded the interviews and then coded them using Atlas.ti to identify embedded themes. We grouped the codes inferred using grounded theory to generate meta-codes that helped us identify socio-economic determinants in design education pathways.

The interviews contained both closed and open-ended questions. We asked respondents their reasons for selections of design education, a nascent career choice in India, and finally, their reasons for selection of discipline. Their views on social determinants were also sought through casual questioning. This included questions about significant influences like family members, school teachers, relatives, cultural icons, seniors etc. We attempted to identify both formal as well as informal mechanisms that led to their choices. We looked at information channels they subscribe to through which they were informed. Further, we asked them about their aspirations and expectations and how they were met or if they remain unfulfilled. The interviews took the form of storytelling, where the respondents constructed a biographical narrative of their experiences. We ensured that the questions did not presume gender as problematic or ask leading questions with a confirmation bias.

Findings

From Admissions Data

The study found a marked difference in enrollment amongst students. We found that in five successive intakes of the school only 35% of the students were male and the rest were female. However, when we broke down this data by year we saw that the number of males enrolled in the department has steadily risen (Figure 1). The Gender Enrollment Ratio (GER) of India is 0.88 (MHRD, 2021), in favour of males, but we see higher female enrollment here. However, the five-year trend shows that this may be changing.

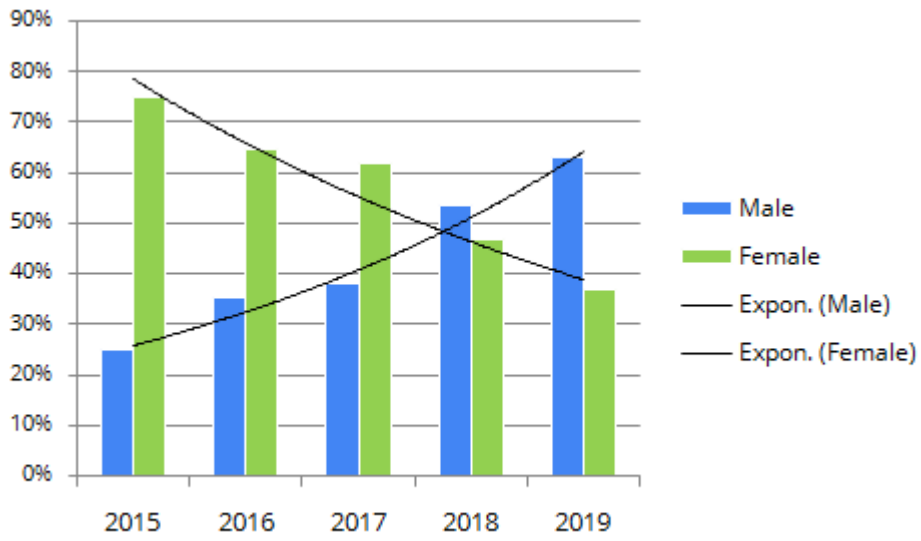

Figure 1: Gender Trend over 5 Years

If we correlate the overall numbers with gender, we find 40% of the male respondents and 54% of the females opted for graphic design. By year data shows that the number of students opting for graphic design has steadily risen (Figure 2). On breaking down the data further, we found more males have been choosing product design while the number of females opting for graphic design has been rising.

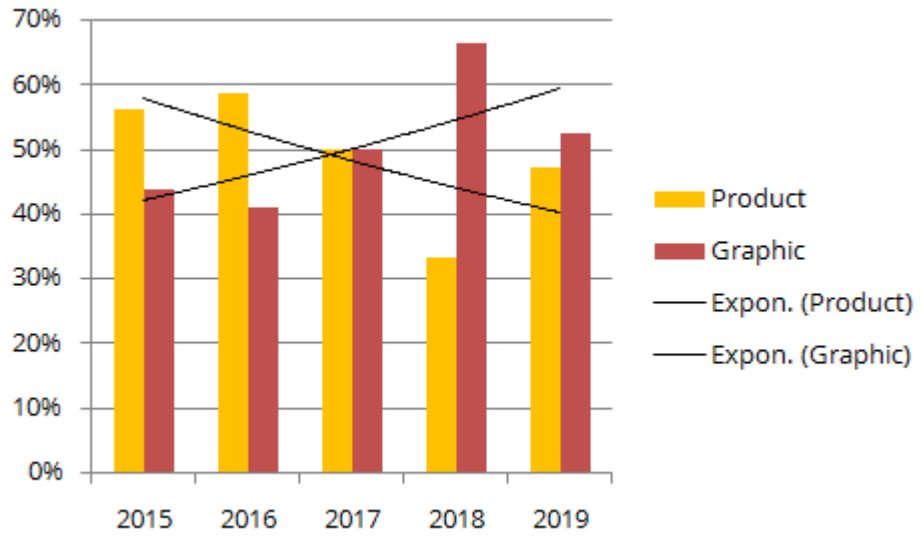

Figure 2: Discipline Trend over 5 Years

In terms of areas where the students came from, we found Tier 2 cities dominated student intakes (Figure 3). The trend in the number of students across different Tier cities was consistent over time, gender and discipline. On closer analysis, adding a gender correlation, we do see more males from Tier 4 towns opt for product design and more females from Tier I cities

opt for graphic design. XXX University itself is located in a Tier 2 city, within easy access of large metro cities (Tier 1) as well as smaller towns (Tiers 3 & 4).

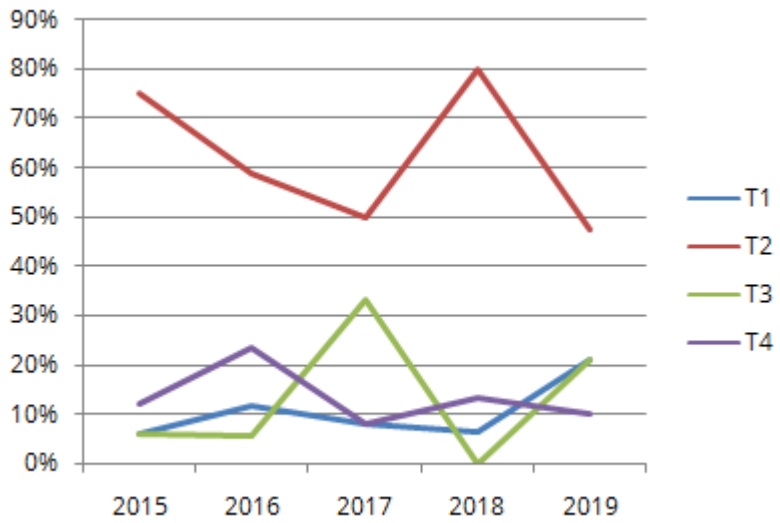

Figure 3: Area Trends over 5 Years

When analyzing family background, we found that mothers of most students were predominantly homemakers, and those employed were generally in salaried service. More male students have working mothers than females. Fathers' employment was consistent for both males and females. Over 60% of the students belonged to lower-middle classes with family income below 10 Lakhs per Annum (USD 14,000), consistent with the profile of government universities in India (MHRD, 2019). There were slightly more females from more affluent backgrounds than males.

If we compared the same indicators across discipline choice in design, we found fewer product design students with working mothers. Fathers' employment status did not vary much, but strikingly, we see a larger number of students from less affluent backgrounds in graphic design, than in product design. 58% students from product design and 80% from graphic design claimed a family income of under 10 Lakhs per Annum. This is cogent with concerns about fees and curricular expenses like workshop and material related costs from the interviews.

From Interviews

Family members emerged as the most influential factor in making education and career-related decisions for both male and female respondents, especially in the case of females where proximity to home was considered quite important. This, to some extent, may explain why more females are opting for graphic design, where they feel the scope of work is limited and restricted to what are seen as 'safe' spaces. The following excerpt illustrates this sentiment:

> *"I can be a graphic designer with one laptop, sitting at home. But product designers always need to run around and collect user information, and make models, and talk to manufacturers. It is so difficult to do that. Some of these places are not even safe for*

> *girls to be roaming around in. My parents also feel better when I work from home."* Female, 25, Graphic Design

Technical competencies and the terminology used for them were found to be a strong influence in student choice. Respondents highlighted the difference in terms used in course briefs and the defined learning outcomes. The two extracts below highlight how course briefs had a prejudicial effect on students.

> *"I saw spatial and 3D understanding as course objective in foundation geometry and I was like this is not me! I have always been so poor in maths in school and I had to do it in design too, so depressing! And what will graphic designers do with geometry?"* Female 21, Graphic Design

> *"I love shaping things and making new shapes like we did in pottery, but product courses all had so much CAD and technical specification in them, each project needed. So I took Graphic Design. But in the first project only I realized that you can't run from software and specification. Or you can design all you want and the printer will make what he likes."* Female 19, Graphic Design

Students relate 'product design' strongly to engineering studies and stronger job prospects. The male respondents seem more swayed by the perception of their choice by others, referencing social stereotypes in their interviews. The excerpts below evidence these propensities.

> *"We chose a discipline after some 10 months of foundation…we barely knew the 'd' of design, it's too soon to choose! Even my parents knew nothing. So I took what I thought could get me a good job…big companies and factories need product designers. Everyone can do graphics, anyone with Photoshop is a graphic designer. Product is serious. It's like engineering."* Male, 22, Product Design

> *"My senior told me graphics is more visual, you need a very good aesthetic sense. I have been so bad at Art from school times. But maths and science was my strong point and product courses had things like technical studies and complex product design and ergonomics. I would have made a good engineer but I did not qualify for IIT. In product design I got to use engineering without studying it."* Male 24, Product Design

Several respondents reported having to convince their families to allow them to study design as an unconventional field. However, the same students also had clear and progressive notions of design education:

> *"It didn't matter that I took Product. I was always in Graphics studio learning typography and calligraphy and all the super interesting courses they had. I mean if I design a machine interface, don't I need to know which font works better and how the printing will happen? We should have more common courses. Like the space design one. I learnt so much in that; really all design is the same, solving user problems. We just give it names differently. Even fashion, aren't they just meeting a need?"* Male, 22, Product Design

Female respondents who opted for product design also reflected a more progressive outlook towards design and society in general, as seen in the excerpt below.

> *"It was fun actually, most of our class was boys and they would act all intelligent and advanced in the workshop but we also learnt quickly. It was so fun to go to hardware stores and ask for a Philips screw! The shopkeepers would look so shocked! Like how does she know?"* Female 22, Product Design

Initial 'access' to design education and then, the ability to make 'choices' regarding future pathways are influenced by various socio-economic markers. The emergent trends within our findings and data analysis point towards the following variables as the influencing factors within accessing design courses: 1) nearby location,2) knowing someone in the field, 3) physical safety,4) long term flexibility, 5) fees and curricular expenses and 6) ability to develop technical competency. These variables emerged as factors for decision making within the respondents. Further, an analysis of the interviews also highlighted the following socio-economic determinants for further choice of courses once enrolled in a design degree: 1) incurred education costs, 2) self-perception of technical expertise, 3) amount of movement required and 4) future success in this field probably populated by able males.

Discussion

The class composition was found to be skewed from the quantitative data (Figure 1) with a larger number of females, though that has been changing over the 5 years of data. Research has highlighted that diversity in class composition in design education brings variety, balance and disparity in ideation and brings different approaches to the table and the benefits of social equality and diversity in engineering and product design education are well-acknowledged (Sterling, 2007; Bjørnstad, 2018). Many of these systematic gender inequalities in design and technical education can be traced back to social perceptions, faculty perceptions and course briefs (Busato, 2000; Brew, 2002; Kvan & Yunyanan, 2005). We see a rise in the number of males in the programme, a majority of whom are opting for product design. We also see a rise in the number of students opting for graphic design (Figure 2), mostly female. This is consistent with Clegg and Mayfield's (1999) findings that gender perceptions influenced discipline choice and evidenced a gendered division. They found a dualism in the over-representation of women in 'soft' design areas and an under-representation in 'hard' design areas. This study found that even though the dominant discourse in design was that of creativity and personal commitment, there was also evidence of gendered competencies.

The majority of the students come from Tier 2 cities, with more females from Tier 1 cities, and more males from Tier 4 cities. More Tier 4 students opted for product design while more Tier 1 students opted for graphic design. This is consistent with previous findings of conventional disciplines still being favoured in smaller cities due to perceptions of higher chances of employability while students in larger Tier 1 towns are found more willing to adopt unconventional career pathways (Nath, 2014; Parmar & Modi, 2017).

Consistent with the profile of government universities in India, most of the students in the programme come from lower-middle class with family income below 10 Lakhs per Annum (USD 14,000) (MHRD, 2019). Design education has high costs associated with materials and tools that

are not subsidized by the government in India, unlike textbooks of the more theoretical disciplines. This leads to valid concerns about overall expenditure. This may also be a strong influencing factor in students opting for graphic design which is perceived as a less resource intensive stream by them.

In the interviews, the current students were guarded in their responses at first, with monosyllabic answers, perhaps worried about any reflection on their incumbent status, but the narrative style of questioning helped draw out their responses. Alumni were more forthcoming and reflexive of their positions, perhaps with the benefit of hindsight and a taste of the real world.

Students who opted for product design had some notions about the discipline, which corroborate conventional perceptions of 'hard' disciplines. Males especially seemed focused on future job prospects. In India, engineering has long been seen as a steadfast, dependable vocation, but entrance exams are highly competitive, and final enrollment numbers are low. Some of these students also seem to switch to product design due to its perceived contiguity with engineering studies. 'Hard' disciplines are assumed to necessitate technical expertise and participation in technical activities and spaces that many females find intimidating. The same factor seemed to be driving the males to choose the 'hard' disciplines. We found that the growing number of males enrolled in the department was seen as a validation of design education as a viable career option, especially for males. Respondents felt that it made the discipline seem more 'serious'. Several male respondents voiced they still had to convince their families to join a design course since design is still seen as a less serious profession, seen more as a feminine vocation with echoes of fashion.

We found that perceptions of the dominant disciplinary discourse influence how females and males choose design disciplines and how gender constraints define the design field. There may be no constraint on what females can do, but what they choose to do is discursively constrained by gendered definitions of the technical. Both females and males we interviewed brought up these constraints. Design is a relatively new area of formal education, still in a nascent state, but our study showed that gendered socio-cultural conventions persist in the form of gendered practice and choice mechanisms.

Reflections & further work

The study was aimed at gaining insights into underlying mechanisms influencing student pathways in design. The main contribution our study makes is through deeper insights into the conventional structure and format of design education, and the influence of gender on the pathways students choose. We aimed to uncover the tacit construction of identity and social perceptions in design. Our findings highlight the problematic perceptions and gendering of design domains in design education in India.

The study was limited by the number of respondents and the geographic area, as it was restricted to the students and alumni of one university in a Tier II city of North India and may not be generalizable across all of India. Further work could include expansion of the study to see if similar outcomes are obtained from additional data collection sites. There may also be a difference between public universities that have a limited intake of students per year and

private universities that make up for the vast gap in higher education in India with very large intakes. The inclusion of parental data on educational background and perceptions will further enrich the findings. Adjustment of access and perceptions can create opportunities for disciplinary choices, which has the potential to affect diversity within disciplines and gender balance within the skilled workforce and open unfettered pathways for the creation of knowledge and innovation. We see our research contributing towards developing the literature for addressing gender equity and access within design education in India. The outcomes can also be used in course restructuring for developing technical competencies. For example, exposure to CAD, spatial thinking, and 3D form perception could be included in foundational learning rather than being limited to certain streams. Many statistical studies exist but more qualitative research is needed to understand the gendered pathways in design education better. Research across geographies and diverse institutions (like public-private, technical-general) is needed to help understand the larger picture better.

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