Towards Re-Imagining Industrial Design Education for the Contemporary Period

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TOWARDS RE-IMAGINING INDUSTRIAL DESIGN EDUCATION FOR THE CONTEMPORARY PERIOD

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ABSTRACT
It is proposed that a progressive Industrial Design education should focus on supporting students in learning to self-manage ambiguity and bolster their agile independence throughout the tentative undergraduate years of growth [1]. As the field of Industrial Design moves beyond its industrial manufacturing roots, exploration of curricula that anticipates contemporary issues such as decolonisation, diverse participation and complexity in creative innovation is still not prevalent in this contemporary period [2]. Such a context necessitates an accelerated disruption to traditional design pedagogical practices [3], as seen in the RMIT University Industrial Design programme My First Six Months (MF6M) - a first-year learner-centred initiative situated around capacity development, student agency, self-efficacy, and disruption of expectations about the power dynamics in learning and teaching. This paper outlines the adoption of the RMIT University, My First 6 Months (MF6M) first-year learner-centred pedagogical alignment into the 2nd and 3rd year *vertically integrated* studio environment, through the case study 'Safeness by Design (SbD)– Enabling an Ageing Workforce' – a collaborative partnership with the Innovation Centre of WorkSafe Victoria, a state government safety regulatory body.
In curating the studio's outcomes, it became evident that the embedded predispositions developed throughout their MF6M experience, activated the diversity of students' thinking and acting in situations resembling real-world design practice, which achieved our SbD studio's pedagogical ambitions.
We found this model to be highly transferable, requiring less teaching staff intervention and giving more flexibility to students, by reinforcing notions of independence, trust and self-efficacy in learning. Students are scaffolded as they dynamically explore and frame their own inquiry questions and continue developing their professional identity throughout their studies. In doing so, the classroom is firmly situated as a safe and democratic creative space, whereby teaching staff adopt a coaching role to establish a collaborative partnership, to further support student capacity and confidence.

Keywords: Design pedagogy, design education, design learning, future perspectives, project based learning, self-efficacy, capacity development, industrial design education

1 INTRODUCTION
Industrial Design as we know it, is currently experiencing a divergent shift from 'old world' manufacturing based outputs, to diverse explorative futures where design is an agile skillset, being applied [2] to increasingly complex wicked problems [4]. In fact, the World Design Organisation [2] expands the definition of industrial design, well beyond its industrial manufacturing roots to "*a more optimistic way of looking at the future by reframing problems as opportunities"*. Linking *"innovation, technology, research, business, and customers to provide new value and competitive advantage across economic, social, and environmental spheres."* The context of which clearly extends the project focus from artefact based industrial outputs to that of information-driven ones. The ever increasing presence of technology [5], diverse arrays of non-traditional and multidisciplinary stakeholders [6], and the complex structures of emerging project forms, all make profound changes to the ways in which the profession operates. As design methodologies become employed more broadly, Industrial Designers are increasingly utilised for their capability to negotiate complex problems within cross-functional and multidisciplinary environments.
Even though there will always be a need for traditional Industrial Design artefact-based outputs [7], this contemporary focus places intensified pressure on education providers to innovate suitable pedagogy [8] to deal with the ambiguity and uncertainty of this contemporary space. The challenge will be in the

provision of relevant skills needed in an information society, emphasising an information, socio-cultural and technological focus, rather than a production-based one [9].
To this point, it appears that most educational systems still operate much as they did at the beginning of the twentieth century [9], delivering a standardised, content rich curriculum, that addresses traditional industrial production-based outputs [10]. In the design field, it heavily relies on a teacher-led approach through a master/apprentice crafts-based model, descended from the Bauhaus/Ulm schools, and delivered through abstracted design practice [3]. Its end goal is achieving a level of proficiency to be professional designers practicing through discrete vocational skills such as drawing, drafting, and engineering, etc. [11; 12].
However, in order to address the future facing needs of the profession, a relevant change in design education will not arise from a steady refinement of this traditional approach, but that the "*context change necessitates an accelerated disruption by breaking the lineage from artefact-based curricula and pedagogies and placing focus on intellectual flexibility and concern for human values*" [3]. Exploration of curricula that anticipates contemporary issues such as decolonisation, diverse participation and complexity in creative innovation is still not prevalent in this contemporary period. It is proposed that a progressive Industrial Design education should focus on supporting students in learning to self-manage ambiguity, strengthen their independence, and promote agility throughout their undergraduate years of growth [1].

2 PROGRESSIVE APPROACHES TO PEDAGOGY

Given the increasingly uncertain environment that design exists within, there seems to be no one right way to design, and by proxy, no one right way to teach it. This in turn, creates complexity in how we define a progressive approach to industrial design pedagogy and how we could address future needs of the profession in an educational setting.
Reflecting on this uncertainty, we seek to capture and distil the essence of a progressive pedagogy, by gathering and integrating some key characteristics from the field of learner-centred educational theories:

- Active engagement in the "*hard, messy work of learning"* [13].
- Motivation to take ownership of learning by shifting the locus of control over learning processes [14].
- Encouraging collaboration, and social construction of knowledge where the learning agenda is shared by all [3].
- And the reflection on learning outcomes and how learning takes place [29; 30].

In selecting these elements, an attempt at a framework or the philosophy of an approach is made, grounding practice and instructional decision making through the notions of deep / transformative learning, self-efficacy [14], and the learner's innate ability in problem-solving [15].
By leveraging authentic tasks and scenarios [18] at the heart of "doing" the subject [15], projects are purposefully situated in ill-defined and ambiguous environments [16], which require an emphasis on multilateral integration of knowledge, skills, and attitudes, with a performance-oriented capability [17]. Power relations in the classroom are aligned to embody partnering dispositions, and the role of the educator is reimagined to work alongside students in supporting and prompting, but not leading their learning [22]. Then practically applying the approach, through the notion of Shulman's signature pedagogies, (Shreeve [19] lists as: studio, project, brief, materiality, dialogue, presentation and the crit.), coupled with guidance from deep pedagogical content knowledge [20], steers learners toward connections with its Community of Practice [21], by privileging the notion of "Design is what Designers Do" [19].
Furthermore, challenging and assessing outcomes, heavily incorporate the practice of reflection and self-assessment [29; 30], reinforcing the learners sense of self-efficacy to channel authentic understanding of curriculum and assessment.

3 CASES FOR CHANGE

Against this changing context for the Industrial Design discipline, the Industrial Design programme at RMIT University plunges students into a research-intensive trajectory that provides opportunities through multiple pathways of design practice including product design for manufacture, interaction design, vehicle design, service design and various art aligned creative practice pathways - all culminating in a significant final year project.

Beyond the foundation year, the pedagogy of the design studio typically uses a vertically integrated model from the second year of the programme, whereby 2nd/3rd year students are combined to learn in studios of their choice. Students are not within their specific year level in studio settings, which requires them to be agile, collaborative, able to self-manage ambiguity within their studio projects, and have high levels of independence to successfully engage.
The need to build capacity in our students from day one, sparked a series of questions concerned with the nature of appropriate 21st century design education, which led to an in-depth assessment of abilities that first year University students needed to function expertly in their second year and beyond.

3.1 Response to change – My First 6 Months (MF6M)

The outcomes of the assessment surrounding student capacity, formed a progressive learner-centred pedagogical approach, across a series of foundation year courses titled *My First Six Months* (MF6M). The aim is to shift the delivery approach, by incorporating "*learning and teaching practices that would encourage students to engage in learning that was personal and socially constructed through their interactions, negotiations and collaboration with peers and teachers, privileging the notion of 'students as partners'*" [22].
These outcomes also drive how the pedagogy and assessment practices of the first-year courses within MF6M were designed. Our intention is to cultivate students' independence and self-regulation as learners [14], fostering their individual development and confidence *"by shifting the locus of control from teacher to learner [23] rather than default to teaching as a performative representation of an assumed or unconscious habitus in design [24]."[22]*.
As a team, we acknowledge that there is no one specific way of '*doing'* design. We draw on constructivist theory and development discourse [25; 27] to then visualise the semester as a 'container' of social, cultural, and work practices rooted in a project-based mode of delivery [18]. This practice attributes learning as staged or performative in the '*act*' of designing. By incorporating a pedagogical approach that privileges students' prior learning, we are therefore open to the ways of the '*doing'* or the '*practising'* of design [19] which embraces diversity and acknowledges authenticity in a space that is student-oriented, and focussed upon the educating event [3].

3.2 Gauging success

Having focussed upon capacity development in the individual student and disrupting expectations about the power dynamics of learning, we found the first-year initiative successfully establishes student's agency and self-efficacy, through application of:
Project-based learning models to encourage practice culture - we observe that students work in tighter peer groups, build more agile teams, with higher levels of self-reliance, and independence. They share and construct knowledge though dynamically engaging in-class discussion and activated peer to peer exchanges.
Modelling professional practice - we regularly invite industry and academic colleagues to sit in on 'glass box' studio presentations, to make connections with the community of practice and stimulate collaboration within the cohort. This often leads to industry acknowledging the quality of students work, and has led to development opportunities, internships, and entrepreneurial outcomes.
Regular formal and informal presentations - privileging the student's voice to build formative and constructive critique, and authentically engage their own critical articulation. We see the success of the approach manifest through high achieving project outcomes where students have developed sophisticated presentations, pitch decks, posters, and various visual media.
Collaborative design of learning and assessment tasks - they work through situations where they must think fast and slow and take responsibility as 'business owners' to reach project outcomes. They do not have imposed benchmarks but feel confident to independently set their own solutions and standards in developing responses to ambiguous design briefs.
Building reflective practice into the studio - students actively engage in, and demonstrate a deep understanding of self-assessment, enabling self-regulation, and sophisticated integration of learning.
Adopt a coaching role or collaborative partnership – we see students take the lead in their own learning, by readily following their own and their peers' intuitive responses to creative problem solving.
The success of this model is highly transferable as it enables us to 'wrap' thematic and agile approaches around student learning every semester. As the diverse nature of projects, classrooms, and associated modes of delivery can vary every semester, we successively shift and align with whatever learning and teaching context best suits each cohort, and then each individual students' needs within that.

4 BUILDING ON CHANGE

As MF6M has been conducted for several years, its graduates are firmly embedded throughout all year levels of the programme. Appropriating the model beyond the foundation year, provides an opportunity to build on already activated learner agency and their sense of self-efficacy. As students' progress through the vertically integrated studio system, we seek to adopt, adapt and determine the impact of the MF6M model, by observing students' development, agency, work practices, and outcomes in the Safeness by Design (SbD) studio space.

4.1 Safeness by Design (SbD) - studio

Since 2019, the SbD studio has been using research and design innovation to provoke conversations that may direct the creation of safer environments and demonstrate the power of design to make a positive contribution to society.

In late 2021, 'Enabling an Ageing Workforce' was the first collaborative project between RMIT University's SbD initiative and the Innovation Centre of WorkSafe Victoria, providing an opportunity for SbD researchers and RMIT Industrial Design students to develop innovative and future-focused design interventions aligned to WorkSafe's current areas of priority.

Specifically, it is a collaborative themed studio exploration (with an external partner) in which students are introduced to the broad topic areas of ageing, wellbeing, and workplace safeness. As they immerse themselves within that proposed space, the intent is to provide a broad scope for students to connect with authentic areas of interest. Working in small design teams, students instigate their own research enquiry responses to complex problems, supported by peers and expertise from tutors and industry.

4.2 Safeness by Design (SbD) – pedagogical approach

This studio uses MF6M as an exemplar learning and teaching model and incorporates two further dimensions of future facing professional practice: *extensive exploratory research through comprehensive review of literature,* (and to reposition the studio from abstract or representational, to a real-world inquiry) *a relevant industry specific investigation with appropriate stakeholders*.

Facilitating the approach, we divide the engagement into several short, accessible, and 'intensive' milestones, iteratively spread over the longer complex project. The 'intensives' are designed to provide opportunities for continuous formative feedback, thereby reassuring the anxieties associated with navigating the complexities of ill-defined and ambiguous problems. Supporting the process further, the provision of all rubrics and measures, up-front, ensures a completely transparent process for students to match or push their comfort zones, as desired. We want students to feel free to explore their own understanding and language of design concepts, nurtured through emerging and ongoing dialogues with peers, teachers and external partners about the quality and standards of their work [29; 30].

Throughout the semester students intensively explore their self-directed investigation, initially by immersing themselves in the relevant discourse of the field and then engaging in a studio wide dialogue. The aim is for students to collaboratively transition from a 'liminal state' [28], iteratively progressing through outcomes, to form clear problem definitions. Students are framed as critical thinkers who can creatively explore problems and ideas, developing confidence to do this self-reliantly and away from the approval of teachers. We advocate that student designers examine their own understanding of user behaviour and situational contexts, relative to others, by responding authentically to safety concerns through their own unique design proposals and/or interventions. Rather than a design specialisation, exploring a socially constructed understanding around user-centred design, accompanied by behavioural considerations and a broad production knowledge base, the process seeks to form a generalist and multidisciplinary approach in realising social impact through a safeness agenda.

Augmenting the research investigation, we concurrently look to the industry partners expertise with consultation and feedback on progress outcomes of the real-world studio engagement, to scaffold the space around students, and kindle their professional identity development from the outset of their studies. By validating their capacity and confidence as designers [3; 19], students are all called on to form the backbone of the review process and give feedback to peers throughout the semester - this is intended to also support students to find their voice, constructively critique peers and openly listen to feedback about their own work. This is enacted at the conclusion of each intensive, in a whole class review comprising industry representatives, academic staff, and peers as an extended sharing and reflection event. We design this activity to model professional practice and stimulate collaboration between students, thus enhancing engagement and rapid capability acquisition. The sessions are

recorded to produce a collective and participatory account of achievements and individual learnings from each intensive stage.

5 CONCLUSIONS

Lecturers observed and confirmed - that the progressive learner-centred framework proposed and conducted in the MF6M context, is a highly transferable approach across studio contexts and was an appropriate exemplar to adopt, validating our pedagogical ambitions.

Student behaviours were demonstrative of notions within constructivist theory and development discourse which supposes that there is no one specific way of 'doing' or 'practicing' of design. Instead, the enhanced student agency has revealed research outcomes that reflected the high participant diversity in the complex creative innovation requirements of this project.

In curating the studio's project outcomes, it became evident that the diversity of students' thinking and acting in situations resembling real-world design practice, led to intersections which are innovative, and highly appropriate to the industries and context for which they are proposed.

This pedagogical approach required considerably less direct intervention from teaching staff, affording students greater creative freedom and flexibility, thus reinforcing notions of independence, trust, and self-efficacy. In doing so, the classroom is firmly situated as a safe and democratic creative space, whereby teaching staff adopt a coaching role to establish a collaborative partnership, to further support student capacity and confidence.

The iterative 'intensives' achieved intent, to socialise students' knowledge over compressed periods and created an immediacy in their ability to implement their learnings. As a result, we noticed that the depth of their content response was nuanced, their communication was more concise, posters were arranged more cohesively, videos were better quality, and their presentations wholly more "professional".

We found that students were enthusiastically engaged and readily gave each other feedback during the presentations, which we collated electronically. This meant that students received all feedback in a permanent format, unlike the spoken word, and were able to reflect on specific recommendations about their work to independently assess their capabilities, concurrently develop their 'critical eye' and understand the gap between what they know and where they want to be. We saw this happening through multiple iterations of their projects as they presented each week, and then in the building blocks of each next phase in their project.

For the researchers - we conducted a simultaneous and comprehensive investigation into the literature on the studio topic, which offered a large scope for inquiry across multiple industries and contexts. We found the students research responses greatly assisted in building a knowledge repository, which flowed back and forth fluidly, refining the studio collective's understanding and direction.

The studio partner - was surprised by the deeply engaged pace of the studio, the range of the design proposals and the quality of outputs. Students delivered solutions attuned to both the physiological and psychological needs of workers, but also effectively imagining and anticipating the future cultural, behavioural, environmental, and technical challenges.

Specifically noting that *"…the outcome for us is a combination of many things - high quality work, innovative desirable concepts, inspiring dialogue, the experience of collaborating with students, and the new connections we've made - which we bring back to our workplace as motivation and reference for our future practice"*. The studio partner also noted that "*some of the concepts are 'accelerator ready' - even in this early stage, there is a clear line-of-sight to tangible impact and benefit pools*" which are now being explored for entrepreneurial opportunities and further development.

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