UNDERSTANDING MOTIVATIONS IN INDUSTRIAL DESIGN GRADUATE EDUCATION: A MULTI-STAKEHOLDER ANALYSIS

Kelly UMSTEAD, Yuanqing TIAN and Carolina GILL
North Carolina State University, United States of America

ABSTRACT
Graduate education in industrial design is evolving to meet diverse student needs and career pathways. This study examines the motivations, challenges and desired outcomes that influence enrolment and experience in a Master of Industrial Design programme. The research pays particular attention to differences between students with undergraduate design backgrounds (Track 2) and those entering from non-design disciplines (Track 3).
This research uses a multi-stakeholder approach, collecting data through workshops with current students (n=7) and faculty (n=4), supplemented by an alumni survey (n=6). The jobs students aim to accomplish, the pains they experience, and the gains they seek through graduate education are collected using the Value Proposition Canvas as a framework.
The findings reveal distinct motivations in which Track 2 students primarily seek technical skill advancement and career readiness, while Track 3 students focus on design process mastery and professional validation. The study identifies three key opportunities for programme enhancement: differentiated onboarding for Track 3 students, explicit research-to-practice bridges, and structured career transition support.
By systematically documenting the diverse drivers of graduate study in industrial design, this research establishes a foundation for evidence-based programme development and offers actionable guidance for programmes seeking to better serve diverse student populations.

Keywords: Design graduate education, Master of Industrial Design, value proposition canvas, multi-stakeholder research

1 INTRODUCTION
Industrial design as a discipline is constantly evolving. What began as a practice oriented toward the form and function of manufactured objects has evolved into a complex, multidisciplinary discipline that now encompasses human-centred design, systems thinking, service design, interaction design, and design research [1], [2]. Today's industrial designers operate across research, strategy, entrepreneurship and leadership that align and respond to social, technological, environmental, and cultural shifts [3],[4]. Designers are driving innovation within organisations and shaping systems, not just artifacts [1]. This expanding scope has placed pressure on design education to keep pace and graduate education has emerged as the critical site where the field must evolve [5].
In the United States, the Master of Industrial Design (MID) degree functions as advanced professional training for practicing designers, a credential for those seeking academic or leadership roles, a pathway for students transitioning into design from other disciplines, and preparation for doctoral study [6], [7], [8]. Because of this breadth, many US programmes have developed multiple curricular tracks to acknowledge different student starting points and learning needs [9],[10]. Generally, there is one pathway for students with undergraduate degrees in industrial design, and another for students entering from non-design backgrounds. This structural diversity reflects a commitment to broadening access to graduate design education, but it also raises a fundamental question: what value does the MID degree offer, and to whom?
Choosing to pursue a graduate degree is a significant decision that requires consideration of time, financial investment, and long-term impact. The diversity of career directions available to MID graduates, spanning product design, UX, consulting, service design, design research, and academia, complicates straightforward return-on-investment assessments. While scholars have examined industrial

design career competencies and job market qualifications [11] and graduate programme thesis outputs [7], there is limited published research examining what motivates diverse students to pursue graduate industrial design degrees, what challenges they face upon enrolment, and what outcomes they hope the degree will provide. Davis (2012) similarly observes that graduate design programmes show little differentiation from undergraduate outcomes, leaving the profession with limited understanding of what graduate study provides and creating confusion about the value of master's degrees in design. This ambiguity has consequences. Programmes that cannot clearly articulate their value proposition struggle to attract and retain the diverse cohorts they seek, and students who cannot accurately assess a programme's fit with their goals are at greater risk of misalignment between expectations and outcomes. A structured approach is needed to understand what different student populations are seeking from graduate ID education and how well programmes are currently positioned to deliver it. A multi-stakeholder view is essential to moving beyond any single vantage point. Current students bring enrolment-moment motivations, alumni offer career-validated assessments, and faculty hold the curriculum design perspective that shapes what the programme delivers.

This study examines the motivations, perceived challenges, and desired outcomes of students and faculty in a Master of Industrial Design programme at North Carolina State University. Using the Value Proposition Canvas framework [12], the researchers conducted a collaborative workshop with current students and faculty to understand how each group understands the value of the MID degree. These workshop insights were supplemented with survey data from programme alumni to capture career-informed perspectives on the programme's value.

2 METHODOLOGIES

The study was reviewed by North Carolina State University's Institutional Review Board and determined to be exempt (IRB # 27726). This study employed a qualitative approach to examine student, alumni, and faculty perspectives on the value of a Master of Industrial Design (MID) degree. Using the Strategyzer Value Proposition Canvas as a framework [12] the research team conducted a structured workshop with students and faculty to identify the "jobs, pains, and gains" that influence enrolment and programme experience in industrial design. Within this framework, "jobs" refer to the goals or outcomes students seek to accomplish through graduate study; "pains" represent perceived obstacles, risks, or frustrations; and "gains" describe desired benefits and measures of success.

Workshop participants included current MID students (n=7) and industrial design faculty members (n=4). Participants were divided into faculty and student working groups. The student group was further subdivided into those with an undergraduate degree in industrial design (n=2) and students without an undergraduate degree in industrial design (n=5).

Each workgroup received access to a digital version of the Strategyzer Value Proposition Canvas, via a Miro board [13], along with digital sticky notes to document their responses. Participants were also provided with digital and printed question prompts aligned with the canvas categories. One researcher facilitated the student groups, explaining the definitions of the jobs, pains and gains prior to data collection. A second researcher similarly facilitated the faculty group.

Participants discussed and documented key motivations, challenges, and expected outcomes related to pursuing an MID degree. Responses were recorded on digital notes on each canvas. After identifying jobs, pains and gains, each participant group was prompted to articulate corresponding pain relievers and gain promoters. The structured data collection session lasted 1.5 hours, with approximately 20 minutes allotted to each section. Each group then presented a verbal summary of key insights to the larger group. This took an additional 30 minutes, for a total workshop time of 2 hours. While pain relievers and gain creators were discussed, this paper focuses on presenting the customer profile dimension (jobs, pains, gains) as foundational understanding of student needs. The development of complete value propositions requires additional iterative refinement and analysis beyond the scope of this initial study. Following the workshop, the research team clustered similar responses and identified emerging themes. Data were analysed using thematic analysis, with codes generated inductively from emerging patterns. Themes were refined through iterative discussion among the researchers to ensure consistency and alignment.

To incorporate longitudinal perspectives, the research team also developed and distributed an alumni survey targeting graduates of both MID tracks. The goal was to capture retrospective motivations for enrolment, reflections on programme experiences, and perceived professional impact. The survey included four sections: background information (e.g., graduation year, track designation, undergraduate

preparation, current employment), pre-programme motivations and anticipated outcomes, reflections on experiences during the programme (including track-specific questions), and post-programme impact (including Likert-scale items assessing perceived career transition and readiness). Questions were both multiple-choice and open-ended. The survey was distributed via email to MID graduates and yielded six responses (n = 6), including two Track 2 graduates and four Track 3 graduates. Closed-ended items were analysed using descriptive statistics and open-ended responses were analysed using thematic analysis.

3 FINDINGS

3.1 Track 2 Students (Undergraduate ID Background)

Track 2 students articulated a strong interest in skill refinement and career readiness. Their primary 'jobs' centred on refining hard skills and technical competencies, specifically product sketching, rendering, digital visualisation, high-fidelity prototyping, and CAD modelling. In addition, they desired to build professional readiness and construct a competitive portfolio. Students expressed a desire to validate their career direction, identify an area of specialty (such as UX or design research) and to be perceived as driven, purposeful designers. Entrepreneurial ambition was also a common motivating factor for this group.

The most significant pains reported by Track 2 students were structural and pedagogical. Students expressed frustration with what they perceived as an overemphasis on research phases relative to tangible product design work, insufficient instruction in industry-standard software (e.g., SolidWorks, Keyshot). Several students felt projects did not advance the work far enough toward commercialization including patents or manufacturing. Career exposure gaps were a theme, where students noted limited industry recruitment presence and the absence of an ID-specific career fair. Regarding critiques, students desired more direct and candid feedback from faculty.

Among the gains, Track 2 students highlighted access to free digital fabrication resources (3D printing, laser cutting), spacious and well-equipped studio environments, and positive relationships with faculty. Teaching assistantships were recognised as a meaningful avenue for professional and pedagogical growth. Notably, Track 2 students also identified learning alongside Track 3 peers as a gain, valuing the diverse professional backgrounds and perspectives that non-design students brought to collaborative work.

3.2 Track 3 Students (Non-Design Background)

Track 3 students entered the programme with a broader set of motivations centred on identity formation, interdisciplinary positioning, and creative self-actualisation. Their primary jobs included developing a comprehensive design skill set, improving execution across all stages of the design process, understanding industrial design's relationship to adjacent fields, and finding a professional niche. Several students perceived themselves as translators or liaisons between design and other disciplines, leveraging their hybrid educational backgrounds. Personal motivations were included as 'jobs', where students pursued autonomy, self-expression, validation, and the completion of tangible creative work.

Track 3 pains were concentrated around assessment ambiguity and prioritisation of feedback. A particularly salient pain was the experience of assumed foundational knowledge at the conclusion of their first year of study, where students felt the curriculum continued as though they had design foundations they had not yet developed. Several also noted tensions between their previous disciplinary modes of thinking and design thinking approaches, as well as the opportunity cost of committing to a graduate degree without a clear sense of where it would lead professionally. Limited mentorship structures, and the number of eligible graduate-level design electives were additional concerns. Emotional struggles, including fear of failure, a sense of being lost in the research process, and feeling underrecognised, also emerged as notable pain points.

Track 3 students valued the programme's open culture, the accessibility and expertise of faculty, access to sponsored studios, and the freedom to pursue elective coursework unavailable in their undergraduate programmes. Facilities, including the materials lab and studio workspaces, were consistently praised. Alumni connections and industry relationships were identified as meaningful programme assets.

3.3 Faculty

Faculty jobs centred on balancing the demands of teaching, research, and service simultaneously. In the classroom, faculty worked to meet students at varied experience levels, provide meaningful feedback, critique work, and support students through personal and academic challenges while building their

creative confidence. Beyond individual courses, faculty were responsible for coordinating content and sequencing across the curriculum, balancing track-specific needs with industry sponsor requirements, and integrating emerging technologies while reinforcing design fundamentals. Faculty also maintained active research and professional engagement responsibilities, including conducting and disseminating their scholarly work, connecting students to industry professionals. Faculty also played a broader institutional role, collaborating across departments, managing admissions, and engaging in interdisciplinary opportunities within the college and university.

Faculty pains included challenges of serving a diverse student body within a constrained teaching environment. Managing students with significantly different skill levels and prior knowledge baselines made it difficult to calibrate expectations and pacing across the cohort. Faculty also noted the sensitivity required when providing honest, critical feedback. The students' varying emotional readiness and mental health needs sometimes made direct critique feel risky, creating tension between the desire to push students and the need to support them. Faculty also navigated competing research and teaching demands and uncertainty about how and when to integrate emerging technologies such as AI into their courses.

Faculty gains reflected high satisfaction with observable student outcomes such as strong visualisation, communication skills, problem-framing and problem-solving competencies. The faculty also valued the broader impact of the programme on students' understanding of how design relates to societal and industry trends. On the professional and community side, gains included meaningful networking and industry relationships, opportunities to bring in speakers from other universities, connections with industry professionals through sponsored projects, and an engaged alumni community that remained connected to the programme. The faculty also valued collegial interactions and active classroom discussions as part of a supportive departmental culture.

3.4 Alumni Survey Findings

Respondents graduated between 2019 and 2022 and had an average of 5.5 years since graduation at the time of participation. Alumni ‘jobs’ centred around three motivations. Career transition was the dominant driver for Track 3 alumni, who sought to pivot into design-adjacent roles by developing design skill sets and professional identities. Track 2 alumni were motivated by skill advancement and disciplinary exploration, particularly the desire to deepen their design thinking and transition into adjacent fields such as UX. Across both tracks, alumni sought professional contacts, industry exposure, and a credential that would make them more competitive in the job market.

Track 3 alumni described a persistent technical skills gap, particularly in sketching, SolidWorks, and digital rendering, that created a prolonged catch-up dynamic throughout the programme. Several noted that too much time spent in the problem-framing phase limited their ability to develop portfolio-ready work. Track 2 alumni reported fewer structural pains but cited weak career transition support, including limited guidance around job searching, portfolio development, and pathways into specific roles such as consulting.

The most consistently cited gain across both tracks was the development of a process-oriented design thinking framework that alumni continued to apply in their professional work regardless of role or industry. Track 2 alumni also reported meaningful growth in professional confidence and a smooth transition into UX design. Track 3 alumni valued the research mindset and the ability to blend their prior disciplinary knowledge with design approaches, giving them a distinctive perspective in the workplace. Across both tracks, alumni cited the collaborative programme culture, faculty relationships, access to facilities and sponsored projects, affordability, and teaching assistant opportunities as significant gains. Likert ratings confirmed the strongest agreement on research capability development and leadership preparation, with more variation on career transition support and network expansion.

4 DISCUSSION & CONCLUSIONS

4.1 Different Motivations Across Entry Points

The findings show that the MID degree serves distinct functions for students depending on their prior education and careers. The programme does not deliver a single value proposition, and what students gain depends significantly on where they start, what they expect, and where they are headed professionally. For students entering with an undergraduate degree in industrial design (Track 2), motivations are centred less on identity formation and more on refinement and validation. These students sought deeper technical execution, stronger portfolios, greater exposure to professional contexts, and clearer pathways into competitive or adjacent roles. Their concerns were about becoming more

competitive, more specialised, and more prepared. Concerns were often tied to perceptions of rigor, industry relevance, and the balance between research-oriented work and tangible product development. Importantly, Track 2 alumni reflections seem to contradict these frustrations. While some current students perceived research emphasis as limiting their making time, alumni frequently identified the programme's process-driven and research-oriented mindset as a professional asset. This shift suggests that certain programme benefits may only become fully evident after students enter practice. The contrast highlights how a value perception may change over time, where elements experienced as constraint during instruction may later function as sources of professional differentiation and adaptability.

For students entering from non-design disciplines (Track 3), the MID serves a more foundational role. Their motivations centred on acquiring a comprehensive design skill set, forming a professional identity within design, and translating prior disciplinary expertise into a new domain. Tracey and Hutchinson (2018) observed that academic discourse has remained largely silent on professional identity development in design education[14]. This absence is significant given that many graduate students, especially those from Track 3, seek validation, community, and clarity about their role in the design field.

Much like Track 2 students who question the research focus while in the programme but come to value it in retrospect, current Track 3 students frequently described feeling disoriented by the research process, particularly when foundational design skills felt underdeveloped. Track 3 alumni, however, consistently identified research capability as one of the most transferable and professionally differentiating aspects of their education. This parallel pattern across both tracks suggests that the research emphasis may be pedagogically sound but insufficiently scaffolded for students who are still developing foundational design fluency.

4.2 Faculty Role in a Two-Track System

Faculty perspectives describe the structural complexity of delivering a single degree across heterogeneous student populations. Faculty are tasked with balancing rigor and support, calibrating critique across varied skill levels, maintaining research productivity, and responding to rapidly evolving technological and professional landscapes.

An interesting finding is the shared concern around critique. Students across tracks expressed a desire for more direct and candid feedback. Simultaneously, faculty described the pedagogical challenge of delivering direct critique within a small cohort context where students vary widely in confidence, experience, and readiness for critical feedback. The programme's culture of support, frequently cited as a gain, may influence how rigor is experienced and interpreted by students. Faculty also act as a bridge between academic design and industry expectations. Their professional networks, sponsored projects, and research engagement serve as a connection between the academy and practice.

4.3 Implications for Graduate Industrial Design Education

This study is limited by the small sample size at a single institution. The workshop included a relatively small cohort of current students and faculty, which constrains the generalisability of the findings. While alumni respondents were several years removed from the programme, allowing for more reflective assessment of long-term professional impact, the limited number of responses means their perspectives should be interpreted as illustrative rather than representative. The findings function as an exploratory analysis rather than a comprehensive evaluation of graduate industrial design education. Future research across multiple institutions and larger student samples would strengthen the transferability of these insights.

Considering current student, alumni, and faculty perspectives, the findings highlight three distinct opportunities for curricular development. First, differentiated onboarding for Track 3 students could address foundational knowledge gaps early, without conflating Track 3 development goals with those of Track 2. Second, a more explicit research-to-practice bridge which may help students understand while in the programme why the research orientation matters for their specific career trajectories. This may also reduce the frustration current Track 3 students experience and accelerate the retrospective value that the alumni report. Third, structured and track-specific career transition support, including portfolio guidance, industry connections, and pathways to non-traditional design roles, would address one of the most consistent pains across both current students and alumni.

Using the Value Proposition Canvas framework proved effective as a multi-stakeholder assessment tool, surfacing not only what students and faculty value but where expectations and programme structures are not yet aligned. Programmes seeking to strengthen recruitment, retention, and curriculum design may find it a productive starting point for structured reflection, particularly where a single programme serves meaningfully different learner populations.

REFERENCES

[1] Meyer M. W. and Norman D. Changing Design Education for the 21st Century. *She Ji: The Journal of Design, Economics, and Innovation*, vol. 6, no. 1, pp. 13–49, Mar. 2020, doi: 10.1016/j.sheji.2019.12.002.

[2] Sleeswijk Visser F. and Stappers P. J. The impact of 'service design' on the industrial design engineering curriculum. In *Proceedings of the 14th International Conference on Engineering and Product Design Education: Design Education for Future Wellbeing*, EPDE 2012. Antwerp, Belgium: Institution of Engineering Designers, 2012, pp. 813–818.

[3] Ramirez M. DESIGNING WITH A SOCIAL CONSCIENCE: AN EMERGING AREA IN INDUSTRIAL DESIGN EDUCATION AND PRACTICE. *DS 68-5: Proceedings of the 18th International Conference on Engineering Design (ICED 11), Impacting Society through Engineering Design,* Vol. 5: Design for X / Design to X, Lyngby/Copenhagen, Denmark, 15.-19.08.2011, pp. 39–48, 2011.

[4] Ceschin F. and Gaziulusoy I. Evolution of design for sustainability: From product design to design for system innovations and transitions. *Design Studies*, vol. 47, pp. 118–163, Nov. 2016, doi: 10.1016/j.destud.2016.09.002.

[5] Davis M. Leveraging Graduate Education for a More Relevant Future. *Visible Language*, vol. 46, no. 1/2, p. 110,113-121A, 2012.

[6] Ren F., Gang L., Xia J. and Li Y. Research on the Academic Ability Evaluation Scale of Industrial Design Graduate Students from the Perspective of Interdisciplinary Education. In *11th IEEE International Conference on Teaching, Assessment and Learning for Engineering, TALE 2022, December 4, 2022 - December 7, 2022*, Virtual, Online, Hong Kong: Institute of Electrical and Electronics Engineers Inc., 2022, pp. 518–524. doi: 10.1109/TALE54877.2022.00091.

[7] Kim B. and Gregorio H. An analysis of master's in industrial design theses at US land-grant universities: A systematic literature review. *DRS Biennial Conference Series*, Jun. 2022, [Online]. Available: https://dl.designresearchsociety.org/drs-conference-papers/drs2022/researchpapers/217

[8] Kim B. and Tian Y. MAPPING TRENDS IN U.S. INDUSTRIAL DESIGN EDUCATION: SYSTEMATIC REVIEW OF MASTER THESES/FINAL PROJECTS," *DS 137: Proceedings of the International Conference on Engineering and Product Design Education* (E&PDE 2025), pp. 181–186, 2025, doi: 10.35199/EPDE.2025.31.

[9] Design school directory. Industrial Designers Society of America. Accessed: Feb. 27, 2026. [Online]. Available: https://www.idsa.org/resources/design-school-directory/.

[10] Directory list of accredited institutions. National Association of Schools of Art and Design. Accessed: Feb. 27, 2026. [Online]. Available: https://nasad.arts-accredit.org/directory-lists/accredited-institutions/.

[11] Yang M.-Y., You M. and Chen F.-C. Competencies and qualifications for industrial design jobs: implications for design practice, education, and student career guidance. *Design Studies*, vol. 26, no. 2, pp. 155–189, Mar. 2005, doi: 10.1016/j.destud.2004.09.003.

[12] Osterwalder A., Pigneur Y., Bernarda G., Smith A. and Papadakos T. *Value Proposition Design: How to Create Products and Services Customers Want*. Newark, UNITED STATES: John Wiley & Sons, Incorporated, 2014. Accessed: Feb. 28, 2026. [Online]. Available: http://ebookcentral.proquest.com/lib/ncsu/detail.action?docID=1887760.

[13] *Miro*. RealtimeBoard Inc. https://miro.com. [Online]. Available: https://miro.com.

[14] Tracey M. W. and Hutchinson A. Reflection and professional identity development in design education. *International Journal of Technology and Design Education*, vol. 28, no. 1, pp. 263–285, Mar. 2018, doi: 10.1007/s10798-016-9380-1.