

TRENDS AND TECHNOLOGY; USING FURNITURE DESIGN TO INFORM A RIGOROUS DESIGN EDUCATION PROCESS

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ABSTRACT

Teaching furniture design is both a means to an end, and a vehicle for supporting other educational agendas. Whilst students may be learning skills specific to a particular vocation; in reality a furniture design project can also be utilised to support the development of a palette of skills essential to any design discipline. Furniture design is an ideal tool for teaching the theory of materials and construction, human interaction and for driving agendas such as sustainable design. At Swinburne University it is offered to both Industrial Design and Interior Design students in the second or third year of undergraduate study, linking trends and technology across a multi-disciplinary student cohort.

The integration of students from different design disciplines allows significant peer based learning opportunities, but adds to the teaching challenge, as students differ in skills and technical knowledge, design methodology and workshop proficiency.

Furniture design and prototyping allows a rare opportunity for a rigorous and critical appraisal process, not often found in student projects. Built furniture can be evaluated for ergonomics and comfort, and structurally loaded and tested for strength, stability, user safety and structural integrity. Construction methods and material choice are easily appraised and designs evaluated against an agenda of sustainability, appropriateness to environment, and user and market needs. In many instances, designing and prototyping furniture allows design students their only opportunity to realise and test their designs in a real world context. Critical appraisal by non-designers through public exhibition is an excellent validation tool for both faculty and student.

Keywords: integrating the design disciplines, furniture design education,

1 INTRODUCTION

This paper examines the study of furniture design as a means of developing 3D skills and informing the design process. The purpose of teaching this discipline to both Interior and Industrial Design students is not to provide a vocational pathway, but rather to enhance the learning experience of a multidisciplinary student cohort and provide new opportunities for critical appraisal. As educators, we have a responsibility to not only ensure that our graduates are imbued with all necessary industry skills, but also with social responsibility and a sustainable methodology. It is also crucial that students are allowed to experiment (and if necessary fail) in order to fully develop as designers. Product design projects are increasingly reliant on 3D-CAD digital outcomes. Unfortunately these student designs can never be fully evaluated or critically appraised

as appearance and function is represented in only a virtual manner. Without realising the design in three dimensions, the student can be seduced by the digital imagery and is often unaware of the deficiencies of the design. Whilst a physical outcome is not necessary for all design projects (often digital visualisations are more than sufficient), in the Interior Design or Architecture disciplines students may never have the opportunity to realise their designs full-size for thorough evaluation. Furniture design education allows students to realise their design proposals at actual size and enables not only lecturer assessment, but also peer review and industry and public appraisal.

2 STUDENT COHORT

2.1 Student skills

Furniture design is generally taught over a single semester in late second or early third year to students studying either the Industrial Design or Interior Design disciplines. At this stage of their studies it is assumed that the basic design skills are in place and students have sufficient drawing, 3D-CAD and conceptual design skills to undertake the demands of the subject. It is worth noting that many students undertake Furniture Design with little prior material or construction knowledge and with often no model making experience. These students commence the subject at a disadvantage to those with workshop experience, however model-making classes are now a pre-requisite and must be completed by week 4 of semester. This enables the students to develop an understanding of furniture construction before the conceptual process begins.

2.2 Multi-Disciplinary Students

Sourced from two disparate disciplines, the students have diverse methodologies and skill sets. Many of the Interior Design students lack the technical expertise, materials and manufacturing knowledge expected of an Industrial Design or Product Design student, and have little interest in the process of development through making. The disciplines use different 3D-CAD software and have differing abilities in product visualisation – particularly in the quality of perspective sketching.

The integration of students from different design disciplines adds to the teaching challenge, but allows significant and unique peer based learning opportunities. The technical problem solving approach of the Industrial Designers combined with the more holistic approach of the Interior Designers, and their innate understanding of spatial issues, exposes students to alternative methods. As industrial designers move from a concern with material objects to thinking of those objects in the context of communication, experience and actions, thoughts and environment, the multi-disciplinary interaction offers great opportunities. [1] Students must explore objects as part of larger systems and environments, and are frequently challenged by new methodology and knowledge.

2.3 Expectations

Expectations are two-fold; in this instance, student expectations often differ from that of their lecturers. Whether students undertake the subject as a mandatory course component or as an elective, most students approach it with some trepidation, doubting their ability to design and construct a working prototype within a twelve-week semester. Students are encouraged to be highly creative and experimental in their approach. Projects are focussed on problem solving, social awareness and appropriate design for user and environment. It is understood that not all students will achieve a successful design and a well-built prototype, however the learning process is fundamentally more

important than the outcome. Students are challenged to both take risks and to challenge the notion of what furniture is, whilst maintaining a manufacturing focus that would allow for low to medium batch production of their designs.

This furniture subject will not necessarily lead to a career in the furniture industry, however all attempts are made to conduct public exhibitions of furniture outcomes and to invite design media appraisal. Although the furniture industry is relatively small in Australia, there are many opportunities for emerging young designers to use their furniture products to develop a public profile and launch their design careers. Previous students have been successful in getting furniture (designed in this subject) into production and many students look upon the furniture subject as an opportunity to gain a powerful folio piece. What does emerge upon subject completion is a repositioning of the students aspirations and expectations, with a stronger appreciation of other design disciplines, a broader palette of skills and a more innovative approach.

3 TEACHING CONTENT

3.1 Method

Furniture Design is taught in 36 contact hours over a twelve-week semester, three hours of design studio per week. Recently contact hours have been reduced significantly, however revised student workloads together with a more focussed teaching approach have maintained the quality of student outcomes. Initial design studios are conducted using brief esquisses (in class exercises) to develop conceptualisation, technical skills and understanding. A typical esquisse may require a cardboard stool capable of supporting a users weight, to be designed and constructed without adhesives within three hours. Esquisses develop quick conceptual thinking and an understanding of the design of load bearing structures, which is the essence of furniture design.

As the student's designs evolve, the teaching method switches to a more consultative format with both individual and group based lecturer and peer feedback sessions. At this stage, although students are encouraged to use mock-ups to test and evaluate their initial designs, the lecturer's input with regards to problem solving, structure and construction can significantly affect the overall success of the design.

3.2 Skills

This subject serves as a vehicle that encourages a greater understanding of three-dimensional form, an appreciation of ergonomics when applied to a particular need and materials and construction knowledge. The subject allows students to:

- examine real world furniture problems such as stacking, folding, rocking, storage;
- examine the links between architecture and furniture including spatial awareness;
- develop an understanding of product interaction and applied ergonomics;
- develop sustainable and socially responsible designs.

3.3 Teaching agendas

Furniture design is taught to develop awareness of many critical issues facing the design profession such as sustainable design, socially responsible design and human centred design. All projects aim to stimulate students to develop a more enlightened approach to the design process. Design for the aged, disabled and children encourages a thorough research investigation of user needs, leading to a more informed design outcome. Projects that focus on materials allow the students to gain specialist material knowledge, utilise discarded materials and minimise wastage in the design process.

4 PROJECTS

New projects are written each semester. Whilst all projects follow a similar framework of deliverables and activities, semester themes are unique. Examples of projects follow:

4.1 Recycled/reclaimed materials.

Students utilise industrial off-cuts and discards to develop furniture pieces for particular environments. This project was inspired by the furniture of Fernando and Humberto Campana and highlights the material wastage inherent in many manufacturing sectors. By identifying the materials and evaluating their properties before starting the design process a new way of working is revealed. The students conceptualise within the boundaries of the material properties and can experiment as they progress. This is a departure from the typical approach where students style the product then seek materials that fit the design intent. A purer form of design is implemented, where students respond to the material; its form, colour, properties and utilisation potential.

4.2 Flat-pack furniture

The design of flat pack furniture (capable of multiple assembly/disassembly) that utilises no mechanical fasteners challenges the students to explore new and historic methods of component connection. Intersections between components must be carefully analysed, the stress directions determined and a solution found. As the reliance on fasteners is removed, students become adept at using the users weight to 'lock' the assembly. The importance of accurate tolerancing is reinforced, as is the use of tapers, locking pins and traditional wood joining systems. Students experiment with the notion of utilising the inherent memory of the material to maintain an assembly and discover the difficulties of designing for home assembly by an unskilled user without tools.

4.3 Reconfigurable furniture

Furniture designed for the inner-city laneway cafes that proliferate around Melbourne has a multitude of intended learning outcomes; an understanding of human/product interaction, a strong connection with the built environment and the development of a more technical solution. Students are challenged by the need to design and produce lightweight yet robust furniture capable of reconfiguring to facilitate storage. Chairs must be capable of folding, stacking, nesting or simple disassembly to reduce overall volume when stored, to less than 40% of that when in use. Stability and safety become the focus as students develop collapsible systems and endeavour to ensure the integrity of the assembly under load. The ability to conceptualise and resolve a complex three-dimensional reconfiguration is a major challenge to be overcome by students, and staff.

4.4 Architectural focus

Students are given a list of specific architecturally significant buildings, both commercial and residential; and asked to research those buildings, document the styling, materials palette and usage patterns then respond with a furniture design. Examples of inspirational architecture used in this project are Jakob and MacFarlane's Georges Restaurant at Centre Pompidou, Steven Holl's Turbulance house in New Mexico and Santiago Calatrava's TGV terminal at Lyon. In this project students examine the role of furniture in the spatial environment and respond in a harmonious, reflective or discordant way. The project serves to expand the students design cultural knowledge and aesthetic sensibilities and allow greater multidisciplinary interaction.

4.5 Design for children

Designing for children especially those in the 3-5 and 5-8 age brackets is a challenge that involves user understanding and empathy combined with a strong cognitive sensibility. Under-fives as pre-readers use a different visual language to communicate. This demographic tends to be visually dependent and interpretive in their approach. Over-fives have a stronger understanding of their environment and are looking for more intellectual challenges. Furniture for children must address a range of anthropometrics, cognitive skills, coordination and balance. Designs must be inherently stable (even at extreme angles), safe and robust, and facilitate varying user interaction and experience. Students must understand users needs from a vastly different viewpoint to their own.

5 FURNITURE MAKING

Prototyping is crucial to the furniture design learning process. It is not expected that all student prototypes will be fine examples of furniture construction, however the students are asked to construct furniture capable of supporting the appropriate weight, with a level of finish suitable for exhibition. This takes many students out of their comfort zones and places significant pressure on their time management, however it is necessary for their development for the students to engage physically with their evolving designs. The subject does not set out to educate furniture makers, but rather to inform the design process. Students are not expected to manufacture all of their furniture; rapid prototyping, laser cutting and CNC routing are all utilised in the prototyping process. It is an essential part of the educational process that students learn to effectively communicate their design intent through documentation, supplier engagement, material sourcing and project management. Students may use specialist fabricators, however designs must be fully resolved and documented before seeking outside assistance.

6 OUTCOMES

6.1 Critical appraisal process

Prototypes are built and then presented to lecturing staff, professionals and student peers for evaluation. This evaluation process, especially the peer review, is crucial to the students understanding of the success of their designs. The furniture is demonstrated by the student, tested by a range of people with different expectations and anthropometrics, and then exhibited in the Faculty of Design gallery. Furniture is unique from a product perspective in that almost everyone understands the language and is an informed critic. Whilst it is difficult for a non-designer to understand and reflect on a product outside their field of knowledge or experience, the intimate nature of furniture results in critical appraisal from the most unlikely, but no less valuable, sources. For these reasons, the public exhibition is a valuable tool in the learning process as it enables the student to observe the interpretation and non-contextual use of their designs by uninformed users.

6.2 Industry feedback

Exhibiting student designs at furniture industry exhibitions has proved a great resource for project continuation. Student furniture designs are regularly accepted into 'emerging designer showcases' providing the students with access to industry personnel and to the wider public. This provides validation for the students and a means of benchmarking their work against the designs of other students and professional commercial design. Staffing the exhibition and presenting their work to the wider design community gives the students both a source of pride in their own achievements and exposure to the realities of the commercial furniture industry. The exhibition of furniture that can be

tested and evaluated by industry professionals removes students from the comfort zone they inhabit when exhibiting scale models or fragile mock-ups of their designs. This is confronting for some students, but is an essential step in their development as designers. Students gain experience in presentation, marketing, and entrepreneurial networking.

6.3 Media profile and career launch

With the plethora of interior design and architecture magazines, many opportunities exist for the entrepreneurial student to build a media profile using their furniture designs. These magazines need monthly content and are usually keen to establish links with emerging designers; many magazines conduct their own design awards, including student or conceptual categories. Student designers can use competitions and exhibition opportunities to launch a career in the design industry with a single piece of furniture. A past student has been featured in design magazines and on television, been invited to participate in many exhibitions and has won several prizes with a furniture prototype designed and made in a twelve week semester! This product is now in production and the student has used his profile to launch his interior design career.

7 CONCLUSION

Furniture design is an excellent vehicle to stimulate 3D design education. Furniture is a large product with inherent contextual, aesthetic, and structural issues for the student to resolve. Successful designs rely on an understanding of materials, their properties and manufacturing processes. It is an intimate product that is used in varying social and cultural contexts and it must be comfortable and appropriate for the chosen environment. Students designing furniture have the opportunity to demonstrate aesthetic and human centred sensibilities and design proficiency in a context that allows real world understanding and evaluation. Prototypes can be evaluated against ergonomic and aesthetic criteria, assessed for load bearing and functional performance, and exhibited as a means of design validation and self-promotion. Furniture design programs are ideal for multi-disciplinary design programs, as they encompasses a wide range of skills with design outcomes that are easily accessible for the wider community.

REFERENCES

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Acknowledgements

This paper is dedicated to the memory of Ettore Sottsass (1917-2007), the father of 'Memphis', who encouraged humour and culture in the design process and inspired young designers, including the author, to challenge the expected design conventions.

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