

# A CASE STUDY OF AUTHENTIC LEARNING UNDERPINNED BY DESIGN THINKING AND INDUSTRY COLLABORATION

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## ABSTRACT

This paper will present a case study of a year-two product design project that has been developed alongside the specific requirements of an industry collaborator and delivered within an innovative, research-led, Design Thinking (Brown, 2008) framework, providing an authentic learning experience for students. This tightly structured approach aimed to “engage students in real-world inquiry problems involving higher order thinking skills with an authentic audience beyond the classroom” (Rule, 2006), through the integration of industry orientated needs and constraints.

The paper will discuss the overarching approach to the development of the project including the key principles and theories that underpin the curriculum. The paper then discusses collaboration with an industry expert to develop the pragmatic design and industry constraints focusing on economic feasibility, functional viability and product desirability. In addition, it includes a description of an innovative Design Thinking framework that has been developed as part of a PhD research project.

The paper concludes with a discussion of the impact of this tightly constrained, authentic learning approach on the design expertise development of students. It also discusses the tensions in developing a learning and teaching approach for year two students that balances Design Thinking (empathising and radical idea generation) and pragmatic, constraint driven design.

## INTRODUCTION

The constraints imposed by a combination of industry collaboration and tight adherence to an innovative six-part ‘design thinking’ framework contributed significantly to a successful outcome for a group of second year product design students. Summer camping in New Zealand is an enigmatic activity where individuals and families pack enough equipment to create all the comforts of home in order to spend days or weeks of getting ‘back-to-basics’. A project brief developed in collaboration with

camping equipment manufacturer asked student groups to design or redesign, develop and present an innovative, viable and feasible product proposal aimed at enhancing the experience of family camping.

Over a six-week period students were required to unpack the camping experience and explore its many meanings and interpretations. They were asked to select from the range of research methods or 'tools' in the Design Methods Toolbox (Withell, 2012) such as 'role-play', 'observation' and 'photo-ethnography', to use in their investigation. During week-one a knowledge gathering field trip was organized aimed at building empathy for the user-group/audience/target market. Literature and Internet reviews along with market research were employed to fully contextualize the project and enable a thorough understanding of the problems, issues and opportunities campers face. In addition, a heuristic enquiry (Douglass & Moustakas, 1985) with students reflecting on their own experiences and recording them on weekly blogs was to contribute to the data gathering. Developing solutions to these problems using Withell's (2012) innovative 'design thinking' framework would shape the remaining 5 weeks of the project.

## INDUSTRY COLLABORATION

Freedom Camping CEO, Richard Knauf in a presentation on day one of the assignment introduced his company, its products, its values, and its business focus. As a design-led outdoor equipment manufacturer and importer based in Hamilton, south of Auckland, one of their key product ranges is based on high quality canvas tents, bedding, seating, storage and cooking for family campers. Other product ranges include high performance outdoor equipment for more activity-oriented campers. The family focused canvas tent range is renowned for its ruggedness, water-tightness and integrity under extreme conditions. Accessories developed alongside tents are also expected to maintain the levels of integrity and high quality. Knauf identified two distinct market segments for his products; The action-camper looking for the minimum in camping equipment to facilitate an overnight or weekend sport or activity focused excursion and the family-camper looking for all the convenience of a home-away-from-home, often spending 7 – 10 days set-up regardless of weather conditions. The 'family camper' purchases significantly more product to make their time as convenient and enjoyable as possible. A number of Freedom Camping products, such as seats and camp kitchens, are sourced from existing manufacturers, based in Asia, and re-branded. However, others are designed in-house with offshore manufacturers being sought to partner in development. New Zealand's relatively small market size and the high risks of launching new products have forced Freedom Camping to develop an innovative approach to overcome the high costs of tooling and production quantity limitations imposed by Chinese manufacturers.

The constraints imposed by collaborating with an innovation driven business are manifold. In broad terms, they require products which are technologically feasible, economically viable to produce, and are usable and emotionally desirable to those that purchase them (Fig.1). Lightweight, hardwearing, water-resistant and space-economy are some of the more specific physical requirements of products used in the camping context.

Although students had developed fundamental and pragmatic design skills (sketching, prototyping, CAD, etc.) and a structured design thinking process over the previous two semesters, this was the first assignment where the pragmatic skills and design thinking process converged, asking students to initially find a 'problem' and then develop a product solution to address it. With the added pressure of an authentic client aiming to find "... a product breakthrough, to 'solve a problem that people don't know they have'..." Students thought Knauf's introduction to the brief "was a good opportunity to gain an understanding of what the company is about as well as the user groups who purchase their products." And thought the talk also "served as a reminder of the importance of empathy in driving successful design."

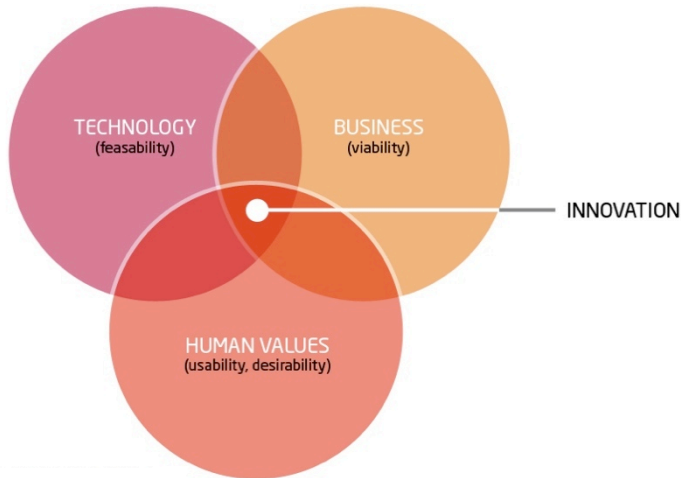


Fig. 1 Design Thinking; Feasibility, Viability, Desirability Model. (HPI School of Design Thinking)

## AUTHENTIC LEARNING APPROACH

Providing authentic learning experiences for students is important. "Authentic learning involves exploring the world around, asking questions, identifying information resources, discovering connections, examining multiple perspectives, discussing ideas, and making informed decisions that can have a real impact" (Callison & Lamb, 2004, p. 34). The greater contextual information afforded by an authentic learning approach enables/requires a broader interpretation of issues and solutions, not achievable within a simulated project brief. According to Reeves, Heerington, & Oliver, (2002), an authentic learning environment can be best described as one where activities represent the types of complex tasks performed by professionals in the field, students have access to resources and engage in collaboration, articulation and reflections and they produce outcomes typical of quality performance. In order to "enhance students' learning as they engage in tasks that reflect the critical characteristics of genuine roles and activities of professionals in real world settings", Reeves, Heerington, & Oliver, (2002) suggest 10 characteristics to include in the design of authentic learning activities:

1. Authentic activities have real-world relevance.
2. Authentic activities are ill-defined, requiring students to define the tasks and subtasks needed to complete the activity.
3. Authentic activities comprise complex tasks to be investigated by students over a sustained period of time.
4. Authentic activities provide the opportunity for students to examine the task from different perspectives, using a variety of resources.
5. Authentic activities provide the opportunity to collaborate.
6. Authentic activities provide the opportunity to reflect.
7. Authentic activities can be integrated and applied across different subject areas and lead beyond domain-specific outcomes.
8. Authentic activities are seamlessly integrated with assessment.
9. Authentic activities create polished products valuable in their own right rather than as preparation for something else.
10. Authentic activities allow competing solutions and diversity of outcome.

In developing this project the authors aimed to engage students at a deeper level by combining the constraints inherent in a client focused collaboration. The project aimed to presenting students with the complexity of real problems in the context of 'the real-world'.

## DESIGN THINKING FRAMEWORK

At the end of their first year of study the students were formally introduced to a Design Thinking framework, developed as part of a PhD research into the role that Design Thinking has in augmenting and enhancing existing university product design and business programmes (Withell, Cochrane, Reay, Gazioulusoy, & Inder, 2012). The initial position of this research is that Design Thinking, while often difficult to define, is a very useful framework to introduce product design students to, if applied in the right context and situation and used to augment existing design frameworks and methodologies.

The research is underpinned by the development of a Design Thinking curriculum (pedagogical approach, syllabus and resources), in this instance a six-week product design project. The curriculum is based on a key conceptualisation of Design Thinking as a *way of practicing* (Kimbell, 2009). *Design Thinking is an evolving, multi-dimensional discipline (way of practicing) that has emerged from the study of the ways that designers think and act.* Design Thinking is effective for:

- Exploring, framing and solving complex, and ill-defined problems (Buchanan, 1992; Cross, 2001, 2011; Lindberg, Noweski, & Meinel, 2010);
- Facilitating and driving creativity and innovation; and
- Valuable way of practicing for both designers and non-designers in disciplines outside of design (Friedman, 2003; Gloppen, 2009; Stickdorn & Schneider, 2011) (Szabo, 2010);.

This conceptualisation of Design Thinking as a way of practicing is further defined as a set of attitudes (Eagen, Aspevig, Cukier, Bauer, & Ngwenyama, 2011; Owen, 2007), expertise (cognition, practical skills and knowledge (Cross, 2011; Lockwood, 2010), and methodologies (Lockwood, 2010). This is encapsulated in the following explanatory diagram (see figure 2)

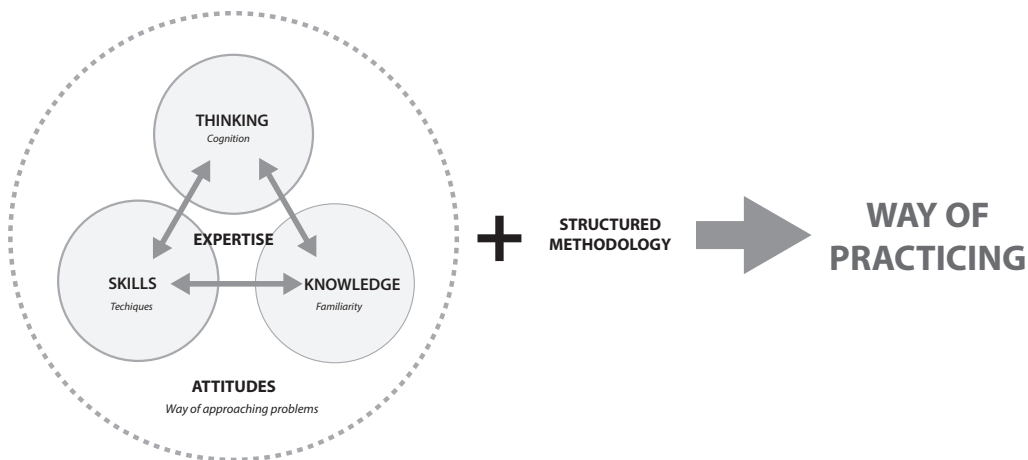


Fig. 2 Conceptualisation of Design Thinking as a Way of Practicing

From the conceptualization at taxonomy of learning outcomes has been developed to help guide curriculum development and implementation

1. **Design Thinking Attitude:** Design Thinking is a way of looking at the world (world-view) and approaching, framing and solving problems. A Design Thinking attitude includes [but not limited to]: Optimism; Empathy; and A desire to be creative and to improve *things*.
2. **Design Thinking Expertise:** Design Thinking expertise is underpinned three key aspects: Knowledge: familiarity with key ideas and concepts; Thinking (cognition): e.g. abductive reasoning and creative thinking styles etc. and Practical 'hands-on' skills: e.g. observation, visualisation, drawing, and 3D prototyping etc.;
3. **Design Thinking Methodology:** Design Thinking is a collaborative, research-led methodology for innovation. A Design Thinking attitude includes [but not limited to]: Principles: e.g. research-led, creative, collaborative and iterative etc.; Structured process model; and A range of individual Design Thinking methods.

A generic design process model has been developed for the curriculum and is underpinned by a set of individual Design Thinking methods (see figure 3)



Fig. 3 "Design Thinking" Process Diagram. Andrew Withell, 2012

The process model is further enhanced by a comprehensive set of Design Thinking Method resources (see figure 4)



Fig. 4 "Design Thinking Toolbox". Andrew Withell, 2012

With this project, students were asked to begin to apply the Design thinking framework, in collaborative groups, but in a more independent manner than when it was first introduced to them. In essence while the project was structured around the design Thinking process model, groups were able to select and apply appropriate methods as they saw fit.

## INITIATE:

The project was introduced during the first session followed by a review of Withell's (2012) design thinking framework. Then followed a talk by client/mentor Knauf who described his business and discussed opportunities for product innovations. The goal of the initiate stage is to get students to plan and orientate themselves for success in the project. Students went on to plan their six-week project and undertake assumption mapping to aid in contextualizing the project. Students, "...discussed how the team would work and completed some assumption mapping to clear our minds for a beginners' approach during the field research phase later in the week." And "...set up a VERY detailed Gantt chart, broken down into the smallest tasks so each day it was only a matter of looking at the chart and doing the task."

## INVESTIGATE:

Investigate focuses on ethnographic type research with the goal of developing key human-centred insights. As part of the initial knowledge gathering to contextualize the project and to begin to develop empathy for the 'family-camper', students embarked on an overnight camping field trip. This gave students an authentic opportunity to undertake the 'observation' and 'role play' research methods introduced in the previous semester. According to one student, this phase focused on "observing others assembling and making use of various types of camping equipment, documenting these observations photographically, and testing out the equipment for myself." (see figure 5). Students reported the field trip as "...a good opportunity to immerse myself in the camping experience and

gather primary research material to serve as the basis for the rest of the design process.” To further contextualize the project, students visited retailers, which “allowed us to see what existing solutions are on the market and how Freedom Camping products compare to their competitors. Shop displays of camping set ups gave us an idea of how retailers expect their products to be used and allowed us to interact with some of these products in person getting a feel for the quality involved across different price brackets.”

## GENERATE:

Evidence of the value the role-play aspect of the field trip described by one student, “It was made clear the priorities consumers place on product purchase can sometimes appear counter-intuitive. As an example [according to Knauf], the amount a person is willing to spend on a comfy camp chair is considerably more than they would on a bed, despite the anecdotal evidence a comfortable bed can make or break the entire camping experience.” Interestingly, after the camping field trip, the same student commented “I have a better understanding for why campers tend to set a higher priority on chairs than beds... seating is a huge benefit to comfort on even short stays”

From knowledge gathered during the Initiate and Investigate stages of the process, students were asked to Generate insights. The timeframe required students to refine or ‘converge’ on the problem area they were looking to address and begin to focus their opportunity search. They were then asked to write a comprehensive design brief further focusing their activities in preparation for a ‘divergent’ round of ideation.

As one student discussed, “This more meticulous approach [to writing a design brief] seems appropriate given the real world nature of the project and will help us to work towards a design that is not only desirable but also feasible and viable.”



Fig. 5 Documenting of role-play, observation and heuristic enquiry during field trip.

## IDEATE:

Utilising 'tools' or research methods contained in the Design Thinking Methods (Withell, 2012), students set about ideating product solutions to the problems/opportunities outlined in and constrained by their design brief. Brainstorms, 'Lotus Blossom' and 'Attribute Matrix' Techniques were among the tools used. Students "...found the attribute matrix to be quite a useful tool for mixing things up and creating new patterns of thought or approaches."

## EVALUATE:

To aid in evaluating their ideas, students developed personas and used scenarios. They developed ideas through sketches, sketch-models, test mock-ups and full size models for role-play (see figure 6). They observed unfamiliar users (students from other cohorts) interact with prototypes to inform concept development and refinement. Students discussed "...defining the form of our design through prolific sketching and prototyping." Collaborative decision-making proved difficult at times, "...tension comes from some natural apprehension of making 'the wrong decision' or fear of 'missing an opportunity'." Some groups chose to use a decision-matrix by grading ideas or developments and ranking them against criteria drawn from personas and/or scenarios.

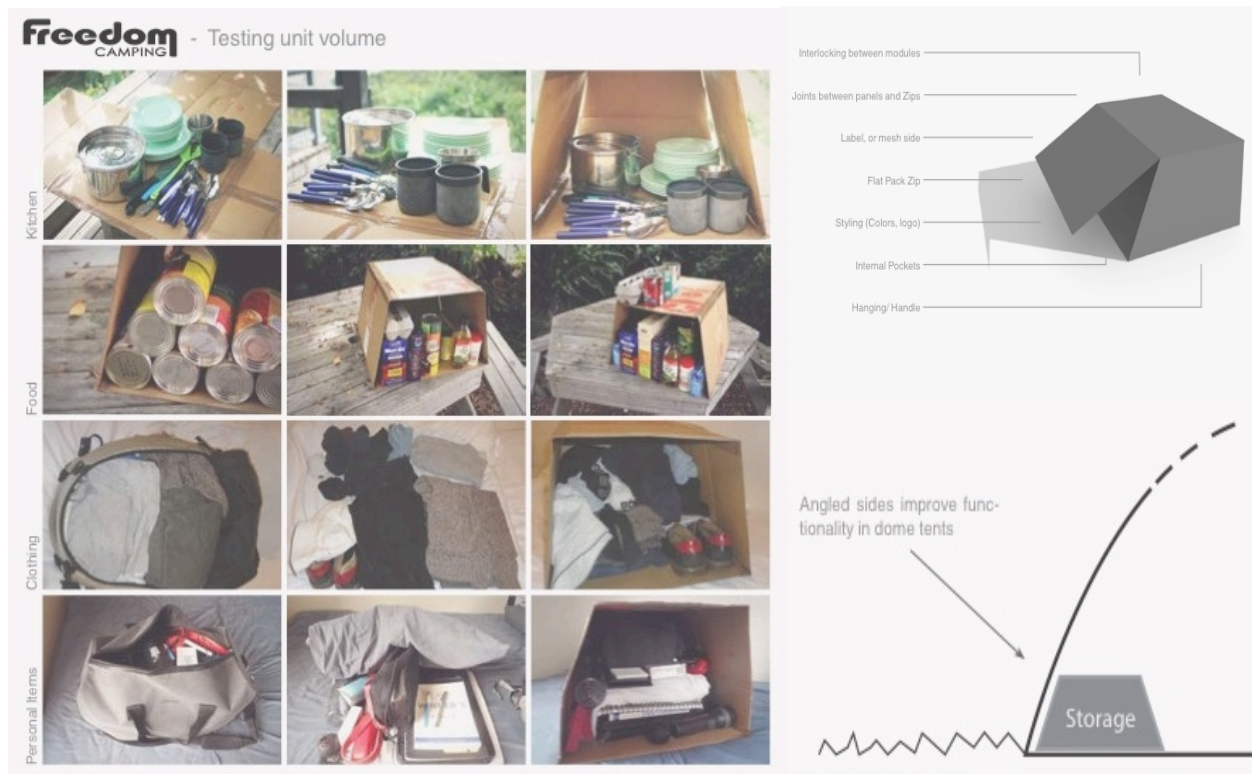


Fig. 6 Prototype and photography used to communicate final design to stakeholders

## COMMUNICATE:

The project concluded with groups presenting their products to stakeholders, Knauf and the authors. The mode of communication was left up to student groups, "...prompting us to think about what it is that we want to say and how best to support our design, whether it be with images, presentation

slides, video or simply letting the model speak for itself.” Students discussed the various options available to best communicate their solution and the problem/opportunity it addressed.

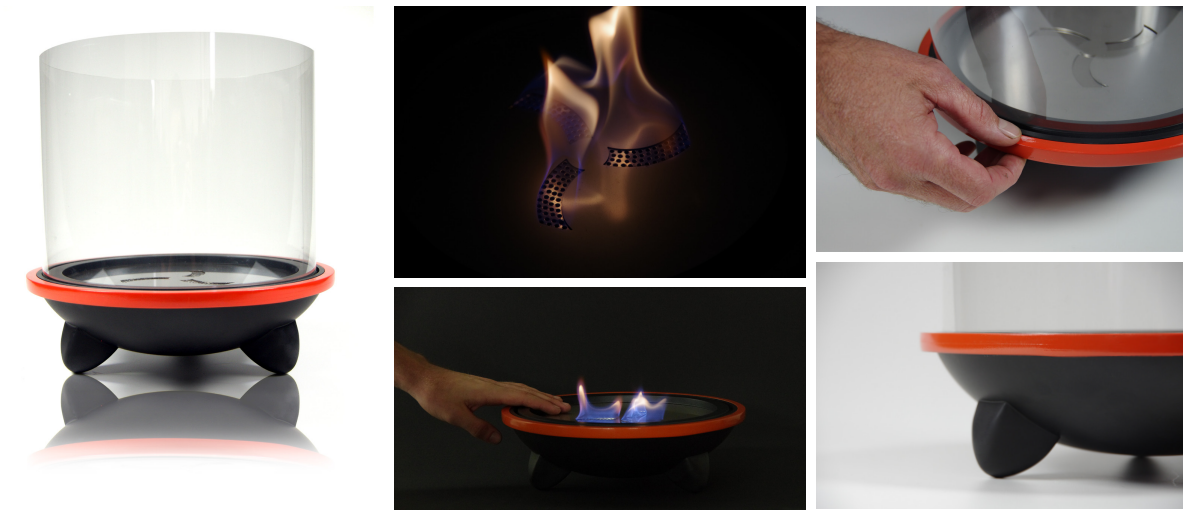


Fig. 7 Prototypes used to communicate final design to stakeholders

## CONCLUSION

This paper has presented and discussed a collaborative project between Industrial Design and Innovation students, and camping equipment manufacturer Freedom Camping. Design thinking has provided a useful and practical framework for enabling students to apply the pragmatic product design skills they have developed in an authentic learning environment.

The tight constraints imposed by this authentic industry collaboration, such as the requirement for solutions to be technically feasible, commercially viable and emotionally desirable pushed students to research deeper, ideate more broadly and refine their solutions further than if the project was a fabricated simulation. Knowing they were to present concepts to an authentic client who is an industry expert further pushed students to become intimately familiar with the industry in order to go past obvious or unresolved solutions the client could easily discount. Anecdotal evidence suggests that students often flounder when project constraints are too loose. The tight timeframes inherent in Withell's (2012) innovative Design Thinking framework also contributed to the success of the project.

CEO Richard Knauf, was impressed with the results and stated that that two of the five project outcomes were “ready to produce today”. A third product, a combined hammer with tent-peg storage was an innovative “solution to a problem people didn’t know they had” i.e. neglecting to bring a hammer to insert tent pegs into hard ground. Another was a solution to social/ambient lighting (see figure 7), which given the myriad task lighting solutions available to campers is surprisingly an area neglected by manufacturers. The solution, a tabletop ethanol fire, generates ambient light as specified in the group’s brief. The group found during their field trip that head-mounted and LED torches available were not conducive to social aspects of the camping experience that took place after dark. The second year students achieved an unheard-of finalist placing in New Zealand’s national ‘Best Design Awards’ and are currently in negotiation with Knauf on production of the ‘Social-Light’

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