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Design students' practice project work with industrial partners: a case study of the learning experiences and the benefits to curriculum development

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Abstract

The value of the learning experiences for staff and students who undertook a high risk commercial design and development project within an academic environment are discussed. This case study traces the development of a product idea through to commercial exploitation and illustrates how these outcomes have been employed as teaching material.

The project utilised a small team of staff and students studying product development, within the Department of Consumer Technology, Massey University, New Zealand. The paper is based on a product for depilatory hair removal and describes the methodologies employed, the management style adopted, and the learning outcomes for both parties.

The areas reviewed and discussed range from project start-up, to post-consumer analysis, exploring the interfaces between the industrial partners and project team.

This is a multi-level investigation revealing insights into how the information has been collated and disseminated as learning tools for course teaching material, the value of such an exercise, and how collaboration with commercial partners can enhance the learning experiences.

Background to project

This project began in September 1993 when Company A, the client company, approached Massey University, New Zealand, with an idea for a product they wished to be developed. The aim of the project was to develop a warm wax body hair removal system which utilised the existing concept of applying warm wax to the skin, but incorporated an hygienic application method. This initiative was the result of criticism over recent years of the professional beauty therapy industry's poor hygiene standards relating to depilatory treatments, and the need for more hygienic working practices (Boghosian, 1994). The main focus of the criticism highlighted the use of reusable application methods and reusable wax (Hince, 1994). These methods had been identified as having the capacity to cross-contaminate infectious diseases (Hobbs, 1994). The focus of the project, therefore, was to develop a product that would address these hygiene concerns.

A multi-disciplinary team including an industrial designer acting as project manager, one full time fourth year student aged 21, studying new product development and two technical staff was established. The team worked closely with the client company who added business acumen and provided the bulk of the funds. The project was also funded, in part, by Massey University and the New Zealand Business Development Board.

Market research

Through the use of focus groups with a beauty therapist, the end-user of the perceived product, and distributors of beauty therapy equipment, it was revealed that the industry relied heavily upon body waxing as a high yield revenue earner, requiring minimal initial investment for the beauty therapist. It was also evident that the therapists were aware of the increased demand by their customers for hygienic methods of wax application. At the most basic level and widely used, a £35.00



Figure 1 The warm wax 'pot' method, widely used in the beauty therapy industry

system contains all the tools required to undertake a body waxing treatment. Figure 1 illustrates pot wax. The investigations also revealed that cost was the main criterion for product purchase.

The main outcomes of the market research identified an opportunity existing to produce a product which embraced the hygienic aspects of body waxing with minimal costs to the user. After some considerable analysis, and before any design work was undertaken, it became apparent that a system which was totally hygienic could not be manufactured realistically for less than £58, excluding the subordinate consumable products associated with the system, packaging and distribution costs.

Design development

During the concept design stage the student was required to assess the types of waxing systems currently available, conducting analysis of the most effective method of body waxing. Using morphological analysis, user

trials and user surveys, it became apparent that the product needed to start from a blank sheet of paper, as none of the existing products was totally hygienic. Following this outcome, a project brief was written by the student and issued to the project team for approval. The student was then required to contact all companies who produced resin waxes, and to attempt an analysis of the chemical makeup of the waxes available. This stage was rather disheartening, as the student's first attempts to access information from industry were rejected. However, the student found that once her involvement in the project increased, she became more confident and consequentially more successful.

In order to document the decisions making process during the project, weekly management meetings were held and used as a tool to help direct work packages. These meetings were minuted and used as action plans, enabling the student to maintain a structured management system, facilitating the manipulation of activities and establishing critical path analysis.

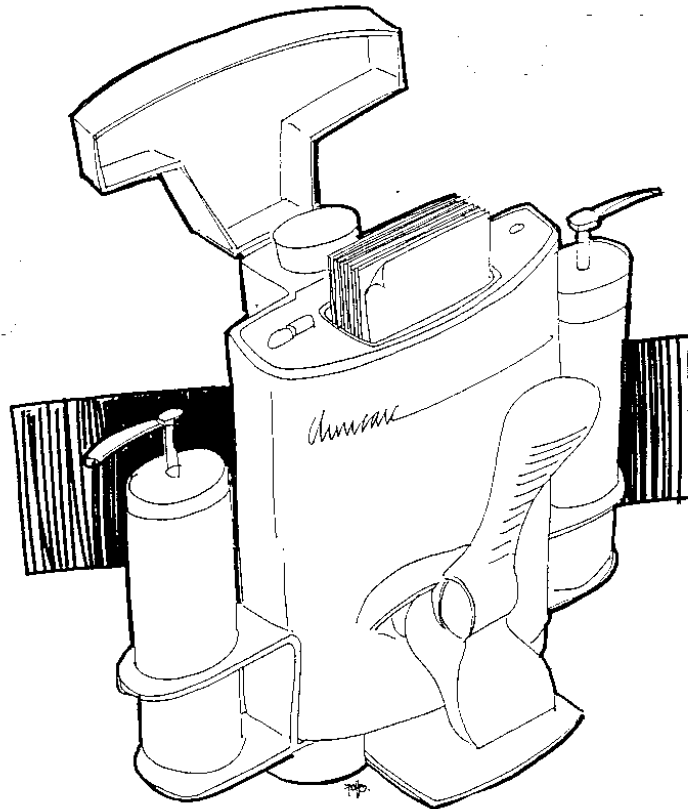


Figure 2 Examples of intermediate design sketches

The management meetings, now partly directed by the student, identified the need for comprehensive user analysis between each iterative design development. In general, it appears that performing specific product design steps will result in higher commercial success rates for new industrial offerings than not doing them. (Hise, 1989). Figure 2 illustrates one example of an intermediate design sketch. This evolution identified a section of industry which the student was able to analyse and hence, identify suitable industrial partners, requiring field visits to companies, and the making of judgements on who best to use as sub-contractors. When it comes to launching or scuttling a new product your judgement can earn you a lot (Carlinsky, 1994). Furthermore, the student was able to build up personal professional relationships with individuals who were able to help facilitate the resolving of problems later in the development process.

The management meetings provided a platform from which a relatively inexperienced

team could overview a complex design and development programme, establish adequate marketing analysis to develop a product specification and locate manufacturing facilities to produce the product. Throughout the process the student was able to facilitate and make key design decisions against which the client company issued substantial resources. This level of confidence by the client company towards the student established a professional relationship which enhanced the student's work and provided intense motivation.

The project team worked closely over a period of 16 months, four of which the student worked full time, two at the beginning and two towards the end of the project. The student's involvement helped to provide a comprehensive design specification including three working prototypes that were user-tested for a period of six months. The concluding data derived from this analysis was sufficient to enable the client company to raise funds to manufacture and mass produce the



Figure 3 The final design and manufactured body waxing system

body waxing system. Figure 3 illustrates the final design and manufactured body waxing system.

The main outcome for the student during the project was the level of contact with industrial partners, or professional bodies who could either offer advice, supply samples or quote for products and services. Furthermore, the pressure of the management meetings established the importance of product ownership and commitment. This was highlighted by the student's motivation towards the optimisation and efficiency of the project.

The outcomes of the project include a patented product, which is distributed world-wide, a technological specification for a product which can be used for educational purposes and an increased level of expertise amongst the project team. The project also provided useful information and data on the interaction between the academic environment and industry, implementing considerable trust between establishments.

Teaching material

As a teaching tool, an overview of activities based on the above information was

introduced to a group of second-year students studying industrial design and technology within the Department of Design and Technology at Loughborough University. This case study overview was introduced via the use of video, slide presentations, workshops and a short project relating to the case study.

In the first instance the students were introduced to the final manufactured product. Explanation concerning its function, design, usability and associated cost were outlined. Students were able to examine the product and ask questions; the product was also made available when ever necessary. After this a video presentation was given illustrating the product in use. (The video used during this session is currently used as a training manual for potential users, and outlines the essential ergonomic, economic and hygienic features of the waxing system.)

Following this the students were given a lecture-based case study, showing a textbook example of the stages involved with the design and development of a product. This was complemented with a slide presentation illustrating the design and development process undertaken during the project outlined above. Each stage, from initial

concept drawings through product assembly, was illustrated, allowing the author license to elaborate on certain circumstances in order to add realism to the presentation. Finally, the group was given a related design project. The brief required the students to design a package to contain a consumable product associated with the waxing system. This required the students to include some of the more important issues associated with the waxing system and to reflect the professional image of the existing product and associated industry. The students had several days to complete the project resulting in a presentation board, a card model of their preferred design and a short presentation.

The outcomes of this exercise in most cases proved valuable, with the students appearing to have enjoyed the exercise, stating that the non textbook case study created realism which added to their learning. As a result, the students involved were surveyed to establish whether the case study had indeed helped in their understanding of the design project and added to their learning of the design and development process.

In order to undertake this survey two data collection instrument were used:

- 1 a questionnaire completed by 34 students
- 2 individual comments from students (completed by eight students)

Appendix I shows the blank questionnaire, Appendix II highlights the collated responses, while Appendix III outlines some comments. These responses were collated three months after the completion of the project.

The survey asked the students to honestly complete ten questions, with the objective of establishing whether or not the use of case study material during their project work had enhanced their learning in a positive manner. Within the questionnaire five categories were used to determine their agreement to the statements: Strongly agree, agree, neither agree nor disagree, disagree or strongly disagree. The questionnaire was completed anonymously, allowing the students to judge the statements freely. To further substantiate the questions, students were asked to add any extra comments on the use of the case study as teaching material; eight students commented, (see Appendix III).

Findings

Students were asked to indicate their responses, on a sliding scale from strongly agree to strongly disagree, to 10 questions relating to the use of case study material as teaching tools. Of the 34 student surveyed (see Figure 4), 85% agreed that exposure to case study material enhanced understanding of their project work; 21% agreed that it would have been possible to achieve the same results

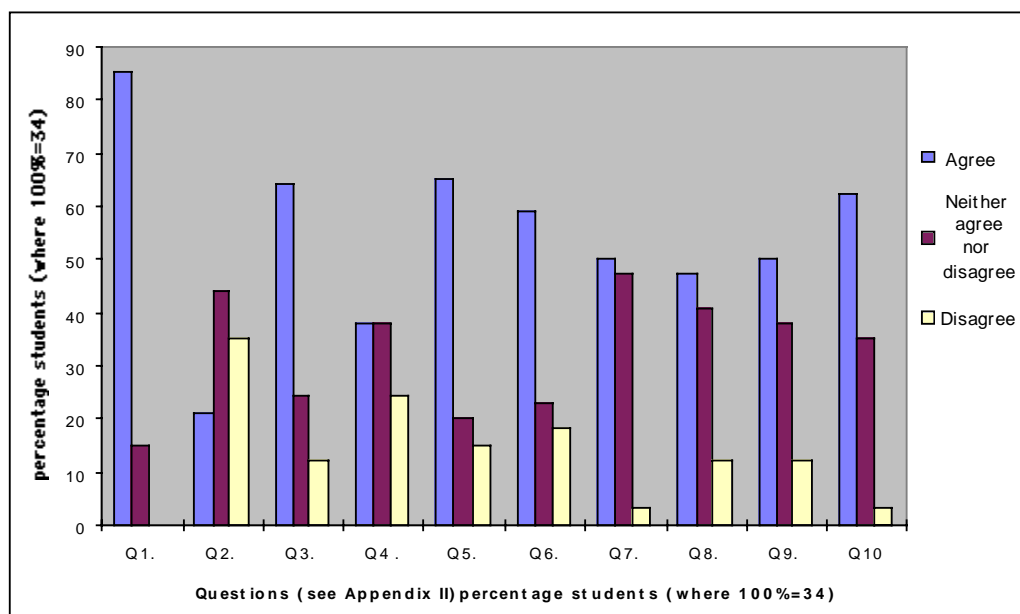


Figure 4 The perceived usefulness of using case study material during project work

without the case study; 64% agreed that the use of the case study enhanced their design thinking; 38% felt the case study had enhanced their cognitive design skills; 65% agreed that the use of case study material positively enhanced their learning; 59% agreed that the case study had provided realism to the project work; 50% agreed that case study material highlights what is achievable; 47% agreed that the case study enhanced their design process understanding; 50% of students agreed that the case study was used effectively; 62% indicated that they would like to see more case study material being used as teaching resources.

Although 85% of student surveyed considered the use of case study material to be useful, 41% of students were undecided as to whether the use of such material enhanced their learning, while 44% were unsure whether the same kind of results could not have been achieved without the use of the case study material.

Conclusion

The findings show that 85% of students felt that case study material is a helpful learning resource during design-related projects. Highlighted problems from those surveyed included the effectiveness of delivery of case study material and the use of too many case studies over various modules. Interestingly, if the case study had been used more effectively, perhaps this may have resulted in the survey not producing high middle ground responses as illustrated in Figure 4.

What is clear however, is that useful and up to date case study material used effectively as teaching material does have a positive effect on student learning activities. As the body waxing case study illustrates, it may be more useful to take sections of a project in order to focus student attention more clearly. What is evident with the comparison of the textbook case study example and the real case study is that they have overreached the amount of information required to facilitate clear understanding.

As a result, it is concluded that using small relevant sections of a case study, which have been integrated into a course module or programme, will enhance the learning activity. The use of slide presentations, workshops and project work all have benefits if managed over a series of lectures or seminars. As with the development of the waxing system by the student at Massey University, weekly management meetings helped to facilitate the design process for a relatively inexperienced member of the team. Perhaps the same approach is required to disseminate case study findings in order to make the exercise worthwhile.

What is clear is that both the student at Massey University and the students at Loughborough University benefited from the use of case study material. Most students seemed to be more interested and involved with their project work through the use of 'realism' in their project work. This pilot study highlights questions that require further investigation such as: Should case study material be introduced piecemeal over a course module? How can the information be disseminated more effectively to enhance understanding of the design and development processes?

References

- Boghosian, S (1994), *Be wax wise*, Skin Inc., New York.
- Carlinsky, D (1994), *Teaching new products old tricks*, Hemisphere, New Zealand.
- Floyd, Chris (1994), *Plan then run like hell*, Design.
- Hince, L (1994), *Clean up your wax act*, Skin Inc., New York.
- Hise, R *et al* (1989) 'The effects of product design activities on commercial success levels of new industrial products'. *Journal of product innovation management*, 6, 43-50.

- Hobbs, W (1994), *Wax recycling prompts HIV warning*, The Press, Christchurch.
- Mockford, C.M. and Torrens, G.E. (1997) 'Students use of the internet resources in the context of design and technology project work'. In Smith, J.S. (ed) *IDATER 97*, Department of Design and Technology, Loughborough University, 161-169.
- Veveris, M. and Goodall, S. (1996) 'Taking a student's product concept idea to manufacturing industry - a case study of the learning experience for both tutor and student'. In Smith, J.S. (ed) *IDATER 96*, Department of Design and Technology, Loughborough University, 95-100.

Appendix I

Questionnaire sheet

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	1	2	3	4	5
1 Exposure to a case study from a real project helped to enhance my understanding of the packaging projects objectives.	1	2	3	4	5
2 It would have been possible to achieve the same kind of results for this project without the case study.	1	2	3	4	5
3 The use of a case study from a real project enhanced my design thinking in relationship to the packaging project.	1	2	3	4	5
4 The use of a case study from a real project enhanced my concept design development.	1	2	3	4	5
5 The use of a case study from a real project positively enhanced my learning activity.	1	2	3	4	5
6 The use of a case study from a real project added realism to my design work in relationship to the packaging project.	1	2	3	4	5
7 The use of a case study from a real project highlighted what is achievable.	1	2	3	4	5
8 The use of a case study from a real project enhanced my learning of the design process.	1	2	3	4	5
9 The case study example was used effectively.	1	2	3	4	5
10 I would like to have more case study material included during lectures whenever possible.	1	2	3	4	5

11 If you have any further thoughts concerning the use of case studies as teaching material please take a few moments to record your comments

Appendix II

Questionnaire collated responses

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	1	2	3	4	5
1 Exposure to a case study from a real project helped to enhance my understanding of the packaging projects objectives.	85%		15%	0%	
2 It would have been possible to achieve the same kind of results for this project without the case study.	21%		44%	35%	
3 The use of a case study from a real project enhanced my design thinking in relationship to the packaging project.	64%		24%	12%	
4 The use of a case study from a real project enhanced my concept design development.	38%		38%	24%	
5 The use of a case study from a real project positively enhanced my learning activity.	65%		20%	15%	
6 The use of a case study from a real project added realism to my design work in relationship to the packaging project.	59%		23%	18%	
7 The use of a case study from a real project highlighted what is achievable.	50%		47%	3%	
8 The use of a case study from a real project enhanced my learning of the design process.	47%		41%	12%	
9 The case study example was used effectively.	50%		38%	12%	
10 I would like to have more case study material included during lectures whenever possible.	62%		35%	3%	

Appendix III

Interview Responses

An enjoyable experience, it does seem to take a while for us to catch on. But when we get the hang of it, it proves valuable.

Too many case study related topics may be overloading on the brain. A few to compare and relate to a design task would definitely be beneficial.

The time plan for the project was awkward as looking at the other case studies took the main concentration and devotion out of the project.

In general it's useful to have realistic examples to work from, not always real examples.

The use of the case study enables you to see what is achievable. It doesn't enhance the designing capabilities but gives something to aim for.

I enjoyed the project very much. My only regret is that I did not have enough time to put more work into my outcomes.

The use of the live case study brings to mind the downside and problems that occur in the real world, and make it relevant in a way that a text book (contrived example) ever could. It is also interesting to gain insight into various industries and how they 'work'.

In future having case studies that do not come from a member of the teaching staff might be helpful. This way a more realistic circumstance would be achieved with the project owner coming in for short meetings to specify the brief and then popping in occasionally to check on our progress, and giving criticism.