

ENABLING THE POSTGRADUATE DEVELOPMENT OF ENHANCED RESEARCH METHODOLOGIES AND ANALYTICAL MODELS FOR PRIMARY RESEARCH

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ABSTRACT

De Montfort University's Design Products department has recently expanded both its research activities and its taught postgraduate programmes. Whilst much of the staff's research broadly informs the curriculum, key aspects of this output have a significant impact on the new MDes Design Products Programme and in particular the Level 6 Research for Design (RfD) Module. This 15-credit component was created to advance the students' understanding of research methodologies through both theory and practice-based study. The module's teaching is primarily focused on user-centred goals and has a particular emphasis on social and behavioural research, encompassing observational and interview-based studies, ethnography, user groups and trend forecasting. The module's learning outcomes enable students to gain insights and an advanced understanding of people and behaviour that facilitates the creation of innovative and user-centred new products.

This paper offers an analysis of the curriculum and the teaching strategies employed within the Research for Design Module which support students in developing enhanced research methodologies and analytical models for the examination of qualitative and quantitative research data. Key activities within the module include: (1) A seminar-based project that seeks to analyse the methods and outcomes of a departmental study which established, through ergonomic and user-centred enquiry, changes to working environments brought about by developments in technology and working practices. (2) A primary research and seminar-based project that engenders student reflection on the effectiveness of their own and their peers' applied research and analysis strategies through the interrogation of each others' methods, theories and conclusions.

Keywords: Research methodologies, ergonomics, user-centred design, pedagogy

1 INTRODUCTION: RESEARCH FOR DESIGN

This paper offers a description and analysis of DMU's Design Products' MDes Research for Design Module as an exemplar of undergraduate, curricular and teaching strategies for embedding broad postgraduate-level knowledge and skills within a limited timescale and with a relatively low module-credit value. The module's themes are designed to be universal for BA Product Design study. However, its content is intentionally selective and it is through these expressed judgements that the module's pedagogy should be assessed.

As an example of this selective curriculum; not all of JW Creswell's [1] five traditions of Qualitative Enquiry are explored outside of the *Research Methodologies* lectures. *Biography* does not feature and *Phenomenology* is restricted to research concept generation for Project 1. However, throughout the module, great emphasis is placed on *Grounded Theory*, *Ethnography* and *Case Studies*.

By 'research methodology' (as described throughout this text, specifically and through inference), this paper uses Creswell's interpretation of Bogdan & Taylor's [2] research design definition as a model, i.e. "...the entire process of research from conceptualizing a problem to writing a narrative, not simply the methods, such as data collection, analysis and report writing."

In common with other BA (Hons) Product Design curricula, Research for Design (RfD) is a key component of DMU's Design Products' undergraduate curriculum. Whilst the Department's UG RfD teaching promotes the use and importance of Descriptive and Normative research methods, the majority of the students' learning is focussed on 'post-Descriptive' enquiries. This means that for most of the first two years, and to a lesser extent during the third year, the marking criteria and project

management expectations create a greater emphasis on more Normative, concept-based models of research and product development rather than broader, more searching Descriptive research implemented at the outset of the process. During this period, students predominantly learn about design development (mostly through phenomenological meditation and tutorial discussion), design definition, design specification, CAD and presentation skills.

RfD is such an important tool for developing and distinguishing postgraduate-standard theses and project outcomes that we identified the need for a broader and more detailed understanding of RfD. To address this, a condensed curriculum was developed, within the relatively short timescale of a 15-credit, Level 6, MDes module.

This intensive programme of study not only gives students a foundation in the conventions of research but also, in its initial stages, challenges them with Descriptive research tasks which ultimately enable significant empirical learning about Inductive and Deductive models for research and analysis. The module also develops a broad understanding of the subject through chosen methodological paradigms for the gathering, analysis, and implementation of research for the benefit of design.

Whilst it is expected that students undertake the supplementary reading suggested by the module handbook, this Level 6 MDes module is designed to provide enough of a foundation for its students to undertake subsequent level 7 research without significant additional learning.

In the second phase of the examined module, students embark on a preliminary study into their chosen specialist research area (Project 2). Much of the teaching and learning undertaken and discussed in this paper is intended to inform and set up this second phase of the module and much of the Level 7 curriculum.

2 OBSERVATION, INTERPRETATION AND EMPIRICAL LEARNING

Project 1: Before being taught formally about the distinctions between Qualitative and Quantitative research conventions, or the differences between Descriptive and Normative approaches, this section of the module is initially focused on engendering experiential learning through the pursuit of Descriptive social research with broad goals, through seminar and tutorial-based debate.

Through an initially unencumbered approach to investigating a chosen research realm, students were asked not to define in formal terms which methods they would be using, or indeed what sort of outcomes would be reached. By pursuing Non-Systematic Observational Studies and Question-based Studies, students were instead directed to engage in a speculative, developmental enquiry on a broad theme such as 'Bus Travel' or 'Queuing'. It was emphasised that the data they were pursuing may already have been in the public domain but that for the purpose of the project they should ignore this information to make a study of their own; with the goal of discovering previously unknown (to the students) 'truths' that could become points of departure for further studies.

Through group and tutor discussions, a specific focus within their chosen, broad realm emerged quickly, as did a developing narrative offering possible outcomes and goals for their study.

By discovering these different strands and possibilities for enquiry and by an empirical understanding of 'needs', students were asked (after two weeks of investigations and seminars) to define their projects' outcomes.

Within weekly seminar discussions, students were encouraged to debate with their peers, the nature, direction and validity of each other's research approaches to their chosen focus of enquiry.

This comparative, seminar-based process broadens the students' experience of research and expands their frames of reference when they subsequently come to identify and research their final specialist research areas which form the basis of their Level 7 major design projects and theses.

In order to support the students' burgeoning knowledge of their chosen research area and of the necessity and potential of primary research, in the third week of Project 1 the Module's lecture and seminar series begins.

Lecture 1, *Research Methodologies* (Part 1 of 2) is intended to give students a framework for understanding the work they have been undertaking in Project 1 and of the 'naive' but self-determined rationales they have created.

In pedagogical terms, Project 1's approach engenders an intellectual confidence within the students to make judgements and to develop their own research and subsequent idea-generation methodologies that are to become pivotal at Level 7, i.e. an understanding and ability to articulate, a nuanced and unique approach to design research and design practice.

2.1 Submissions and Learning Outcomes

Submissions for Project 1 were broad; encompassing a range of both Quantitative and Qualitative research and most students found that the process helped them considerably in identifying special areas of interest.

Reports such as *Behaviour Related to Public Seating* began as an enquiry into peoples' willingness to sit in close proximity to others in cafés, transport hubs and a range of other environs. Its conclusion offered insights into how this behaviour is influenced by the subjects' prior and subsequent actions, and these findings were paralleled in the conclusions of another report focussed on *Automated (Customer) Services*.

The discovery of such resonances underlines the important role of the regular, seminar-based discussions between the students, in their developing a deep understanding of the wider meaning of, and potential for, social / behavioural research findings.

Some students changed the focus of their studies significantly from their initial concept. For example, *On Transportation and Motorbike Safety*, which began as an enquiry into peoples' willingness to use more sustainable forms of transport than the car, but which then developed into a questionnaire and interview-based study of the reasons why motorbikes and scooters are currently not more commonly used (a premise based on initial Quantitative, Observational Research). The themes developed in this student report are subsequently being developed by its author's investigation into high performance, low-cost safety strategies and products for motorcyclists.

3 RESEARCH METHODOLOGIES

Delivered as two lectures, this section of the lecture series gives students a foundation in social and product-based research. It describes the conventions of Quantitative, Qualitative, Descriptive and Normative research methodologies and as detailed lecture notes, provides students with a reference guide for the middle and latter stages of Project 1 and beyond.

Research Methodologies encompasses all aspects of research for design, underlining for example the importance of sound theoretical models, the potential for the researcher's influence to distort data, the use of the semantic differential and of the importance of 'tools' such as the Guttman Scale to question-based research.

The lectures use the conventions of language and practice within the research community and direct students to adopt these conventions in their activities and written submissions.

Research Methodologies Lecture 1 is mainly focussed on Descriptive Research and is designed to parallel the students' activities in Project 1 and introduce many of the themes presented and discussed in Section 4, *Ethnography, Trends and Innovation*.

Lecture 2 is more concerned with normative models of research and begins to introduce the themes that are discussed in Section 5, *User Groups, Feedback and New Product Development*.

4 ETHNOGRAPHY, TRENDS AND INNOVATION



Figure 1. Research Foci

This section of the module is designed to explain the use of key research methods by offering an exemplar of combined research and design practice (Seymour Powell Ltd [UK] in 2009-2010). Delivered in three parts; a lecture, a Q&A session with a senior design practitioner, and an academic-led seminar.

The lecture was commissioned with a brief to explain 'research' in the context of design practice, clients and new product development. A key requirement of this commission was for the speaker to

explain how different research approaches relate to a range of design projects and ultimately how a designer makes use of this information for concept generation and product development.

In order for students to gain a balanced perspective on their own developing research activities within the module, and to also remind them of the role of the client in the instigation and implementation of the research and design process, the lecture is delivered via a series of Case Studies. These describe a broad range of projects, clients and research types, which explained the ratios, roles and exchanges between the researchers and designers within the example consultancy (Seymour Powell Ltd [UK] in 2009-2010, whose reputation is built on a research-based insights and innovation).

4.1 Key Themes

Clients

- **Client Focus:** What clients need and want to know
- **Insight:** The necessity of research in order for designers to give their clients what they want
- **Validation:** The need for research insights to be validated in order for clients to be convinced of their worth

Research Scenarios

- **Innovation:** The convergence of people, technologies and business
- **Paradigm Reinvention:** Limited research for clients who already have a defined brief focussed on ergonomic, aesthetic, cost or redevelopment of existing models for 'products'
- **Forecasting:** Discovering landscapes, strategies, solutions for where a brand, technology, function, aesthetic or service should be in the future. Creating Briefs and Specifications

Innovation and New Product Development

- **Known Unknowns:** Not what the consumer wants now
- **New Paradigms:** Product archetypes that a client should make / sell in five+ years time. 'Future Design' products that do not currently exist
- **Disruptive Innovation:** Simplicity versus an innovative trajectory. Identifying threats and opportunities

5 USER GROUPS, FEEDBACK AND NEW PRODUCT DEVELOPMENT: RESEARCH & IMPLEMENTATION

Delivered through a lecture and seminar from a Product Development Manager (Stihl Ltd [UK] in 2009-2010) in the form of a Case Study, and then discussed through an academic-led seminar, this section of the module seeks to encourage the students' awareness of commercial forces and reinforces why (mostly) Normative Research is needed once Descriptive enquiries have established a need for a product or service. The lecture and seminar is also intended to remind students that the role of a designer is only one part of bringing a new product to market and that in-house designers' remit can be very different to those of a consultancy.

It was important that the initial lecture established a context for its Case Study by defining whether it was a typical or unusual scenario and to qualify the former if it was the latter (and vice versa).

A key part of the lecture and seminar commission was the availability of prototypes and final products for reference and discussion during the Industry-led seminar / demonstration. By having examples of the Case Study's focus to hand, and by asking the students to identify problems or volunteer improvements as part of the narrative, it was intended that the students would 'experience' the process and understand the rationales for the product's development that much better.

5.1 Key Themes

Establishing a Need

- **The Commercial Imperative:** Why a market exists, and how great is its potential?
- **Validation of a Concept / Need:** User and Expert Interviews, Observation Studies
- **Establishing a Target Price:** How much would the target consumer pay?
- **Communicating / Marketing the Benefits:** Cost benefit analysis and user models

Design Development

- **Prototype Development:** User group feedback on to stage-prototype developments
- **Field Testing:** Final stage testing and feedback from selected expert users

6 ERGONOMIC/USER-CENTRED OBSERVATIONAL STUDIES: RESEARCH ANALYSIS

This section of the module uses a Case Study of an Extensive Observational Research project as an exemplar of how researchers plan, limit, gather, analyse and interpret observed behaviour and data.

The example study (authored by DMU and produced in collaboration with The Furniture Industry Research Association [FIRA] in 2009-2010) focuses on the use of office storage, which through ergonomic and user-centred enquiry, establishes how changes in design requirements within working environments have been brought about by developments in technology, working practices and behaviour. The example study has a particular focus on personal and immediate 'Active-Stage Storage' [3].

Delivered in two parts via a lecture and extended seminar, this module section primarily seeks to explain how to structure the gathering, collation and interpretation of analogous information that can be characteristically difficult to distinguish and categorise.

At the end of the lecture and in preparation for the later seminar, students are presented with an edited version of the study's report (minus its conclusions) and are asked to reflect on the extent of the study, the methods employed and on how it was structured. Students are then divided into small groups asked to interpret the data by creating a broad specification for 'Active Stage Storage within a Non-Domestic Office'.

6.1 Submissions and Learning Outcomes

As well as broadly producing a good standard of Design Specification, the student groups are expected to demonstrate a very good level of understanding about the researcher's rationale / methodology. The lecture and seminar process also engenders a broader understanding of office environs sufficient for the students to proffer further specifications and concepts within which the Active Storage would fit.

It is envisioned that as the Department's User-Centred Design research activity increases, the *Ergonomic / User-Centred Observational Studies* section of the module will benefit further from the most current studies for which the researchers themselves will also be available to supplement the lecture and seminar components.

REFERENCES

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