A STUDY OF THE DESIGN STUDIO IN RELATION TO THE TEACHING OF INDUSTRIAL & PRODUCT DESIGN

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ABSTRACT

In this thesis the industrial design studio has been investigated with particular reference to studio thinking and learning and project-based activity. This investigation has been set in the context of a final-year, degree program in industrial design that includes a substantial research and development project. From a critical review of the relevant literature the characteristics of studio culture have been identified, together with its role in the teaching of both creative and systematic endeavour. In addition, the history and context of the role of the industrial/product designer is reviewed in order to understand the nature and the required skills of the discipline.

In this thesis, an initial study surveyed academics involved in teaching industrial design in Australia, and overseas. The study sought to determine the approach of students, in various industrial design degree programs, to their final-year projects and the extent to which design process and design methods were incorporated in their project reports. The findings revealed a number of operational needs associated with studio-based learning, particularly those associated with final-year, project-based activity. These findings, together with teachings from the literature concerning how students go about design in the studio and the needs associated with project activity, led to the proposal of a generic model, entitled the Major Project Development Model "MPD Model". The operational criteria in the MPD Model guided the development of a computer-integrated system of design methods allocated to the respective phases of the process. This system, called the "MPD System", is designed to support and enhance student design work in major projects.

A second study was conducted that analysed: student performance in their project reports; the extent to which their design research conformed to the MPD Model; and the extent to which design methods were used in their final-year projects. Criteria and guidelines for the successful conduct and evaluation of such projects have been proposed and set up as part of the experimental programme. The experimental work, reported in this thesis, is based on an in-depth, comparative investigation of a range of major project reports, firstly those produced in the year 2003 during which final-year students did not have access to or knowledge of the MPD System and secondly, those produced in 2004 where students were provided with the MPD System, hence providing two cohorts for comparative purposes.

The theoretical and experimental work have been related, with appropriate results and conclusions, to the following issues: *Design theory* – an MPD Model has been proposed and applied in keeping with a set of operational criteria; *design methods* - a model reflecting a range of methods aligned to phases of the MPD Model have been established in keeping with needs of designers in their execution of phases of the process; *brain-based learning theory* – a model of the integration of the MPD System as a means of linking systematic and creative thinking in the studio process is proposed; *academic performance* – the academic performance of students has been studied and data have been derived which provide valuable information for the design educational process.

The results of this research will encourage use of a more structured teaching and learning approach and the employment of design methods in major projects. This comprehensive research thesis provides a framework for further research and recommendations for further research.

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Table of Contents

List of Tables

List of Figures

Abbreviations and Symbols

ANOVA	Analysis of Variance
CAD	Computer-aided design or Computer-aided drafting
CAE	Computer-aided design
CAM	Computer-aided manufacture
CIM	Computer-integrated manufacturing
CNC	Computer numerical control
DFA	Design for assembly
DFM	Design for manufacture
DFDA	Design for assembly and disassembly
FMEA	Failure mode and effects analysis
MPD Model	Major Project Development Model
MPD System	Major Project development System
QFD	Quality function deployment
PDP	Product development process
VA	Value Analysis
UNSW	The University of New South Wales
TQM	Total quality management
PDC	Product development cycle
DR	Design research
PR	Product research
SPC	Statistical process control