

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

by

Lance Noel GREEN  
BE (*NSWIT*), MDes (*UTS*), MHEd (*UNSW*)

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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

Abstract	(ii)
Acknowledgements	(iii)
Table of Contents	(iv)
List of Appendices	(viii)
List of Tables	(xi)
List of Figures	(xiv)
Abbreviations and Symbols	(xvi)
<b>1.0 INTRODUCTION:</b>	
1.1 Background	2
1.2 Context and scope of research	3
1.3 Aims	4
1.4 Research questions	6
1.5 Layout of the thesis	7
1.5.1 Diagram of the research plan	8
<b>2.0 THE INDUSTRIAL DESIGN STUDIO</b>	10
2.1 Evolution and Development of the Industrial Design Studio	13
2.1.1 Origins of the Studio	13
2.1.2 The E'cole des Beaux-Arts	14
2.1.3 The emergence of industrial design	15
2.1.4 Design Studio in the 20 <sup>th</sup> Century	20
2.1.5 Design Studio in the 21 <sup>st</sup> Century	25
2.1.6 Industrial Design Studio at The UNSW	27
2.1.6.1 The final year and final-year project	30
2.1.6.2 Summary	34
2.2 Teaching and learning in the studio	36
2.2.1 Developments in technology	38
2.2.2 Blending science and art	38
2.2.3 Student learning blocks	39
2.2.4 A model of the student learning process	42
2.3 The nature of industrial design	44
2.4 Design methodology and design methods	47
2.4.1 Design methods	48
2.4.2 The Importance of Design Methodology to Student Designers	51

2.5	The Process of Designing	55
2.5.1	The studio design process	55
2.6	Author's observations- on the supervision of student, final-year projects and in teaching studio supporting courses as a participant observer	59
2.7	A Structured Survey - of other academics regarding their experience in the supervision of final-year projects	60
2.8	Possible strategies - for advancing the research aims of this thesis	61
2.9	The need for further research	62
<b>3.0</b>	<b>THEORETICAL DEVELOPMENT and CONSTRUCTS</b>	64
3.1	A theory of studio learning	64
3.1.1	Tovey's dual-processing model of design thinking	66
3.2	Design process models	67
3.2.1	Archer's industrial design model	69
3.2.2	Cross's engineering design model	70
3.2.3	The consensus engineering design model	71
3.2.4	Bonollo and Lewis industrial design model	73
3.3	Alternative Design-Development processes	75
3.3.1	The product development process	75
3.3.2	A generic model of the product development process	77
3.3.3	Summary	77
3.4	Design methods	79
3.4.1	Design methods specified by Cross	79
3.4.2	Design methods specified by Baxter	80
3.4.3	Design methods specified by Maffin	81
3.4.4	Design methods specified by Eder	83
3.5	Proposed summative model of professional/industrial design process and practice	85
3.5.1	Key questions relevant to this thesis	86
3.6	Proposed Major Project Development Model (MPD Model)	87
3.6.1	Process	87
3.6.2	Methods	88
3.6.3	The MPD Model (an integration of process and methods)	90
3.6.4	Tasks associated with the MPD Model	92
3.7	Proposed MPD System (a suite of computer-based design methods)	94
3.7.1	The MPD System: computer integrated software	95

3.8	Application of the MPD Model and System to project-based learning	101
3.9	A model for measuring “Complexity” of major projects	103
3.9.1	Proposed complexity model for industrial design projects	107
3.9.2	Proposed worksheet for scoring issues of complexity	109
3.9.3	Alternative complexity assessment and evaluation matrix	110
<b>4.0</b>	<b>RESEARCH METHODOLOGY &amp; EXPERIMENTAL PROGRAM</b>	<b>114</b>
4.1	Part 1: Survey of industrial design academics	117
4.1.1	Questionnaire structure	117
4.1.1.1	Management and research	119
4.1.1.2	Conceptualisation	119
4.1.1.3	Resolution and presentation	120
4.1.1.4	Design methods and process	121
4.1.2	Mathematical and statistical analysis applicable to this section of the research programme	123
4.2	Part 2: Survey of graduates and graduands	124
4.2.1	Research propositions	124
4.2.2	Questionnaire structure	126
4.2.2.1	General questions	126
4.2.2.2	Design methods	129
4.1.2	Mathematical and statistical analysis applicable to this section of the research programme	134
4.3	Part 3: Examination of major project reports	136
4.3.1	Examination to determine project tasks included in project research and project reports	136
4.3.2	Examination to determine the Complexity of reports	138
4.3.3	Mathematical and statistical analysis applicable to this section of the research programme	139
4.4	Experimental programme and ethics approval	140
<b>5.0</b>	<b>RESULTS &amp; DISCUSSIONS</b>	<b>142</b>
5.0	Demographic characteristics of respondents	142
5.0.1	The Industrial Design academics	142
5.0.2	2003 graduate students of industrial design at UNSW	144
5.0.3	2004 graduand students of industrial design at UNSW	147
5.0.4	A comparative demography of 2003 and 2004 students	149
5.1	Part 1: Survey of industrial design academics	151
5.1.1	Management and research	152

5.1.2	Conceptualisation	153
5.1.3	Resolution and presentation	154
5.1.4	Design methods and process	156
5.2	Part 2: Survey of graduates and graduands	160
5.2.1	Phase 1 - Survey of graduates: major projects in 2003	160
5.2.1.1	Testing of the data in Table 5-13, the responses to Questions 1-8	161
5.2.1.2	Determination of the design methods used by the 2003 cohort of students in the final-year projects and project reports	163
5.2.2	Phase 2 - Survey of graduands: major projects in 2004	166
5.2.2.1	Testing of the data in Table 5-13, the responses to Questions 1-8	167
5.2.2.2	Determination of the design methods used by the 2004 cohort of students in the final-year projects and project reports	169
5.2.2.3	A comparison of the 2003 and 2004 cohorts in relation to the design methods used in their projects	172
5.2.3	The extent to which the MPD System contributed to the stages of the 2004 cohorts major projects	176
5.2.4	Open-ended question posed to the 2003 and 2004 cohorts	180
5.3	Part 3: Evaluation of final-year project reports	183
5.3.1	Examination of 30 project reports from the 2003 cohort	183
5.3.2	Examination of 30 project reports from the 2004 cohort	185
5.3.3	A comparison of 30 project reports respectively from the 2003 and 2004 cohorts	187
5.3.4	Examination of the complexity of 30 project reports from the 2003 cohort	189
5.3.5	Examination of the complexity of 30 project reports from the 2004 cohort	191
5.3.6	A comparison of the complexity of 30 project reports respectively from the 2003 and 2004 cohorts	194
5.4	Examination of the extent of: use of design methods; inclusion of tasks and structure; and independent assessment of the quality of projects	197
5.4.1	The extent of use of design methods and the effect on project quality	197
5.4.2	The inclusion of tasks and structure and independent assessment and the effect on project quality	198
5.5	Complex projects and the extent to which these include a higher of design methods, tasks and structure	201

<b>6.0 FINDINGS and CONCLUSIONS</b>	206
6.1 Introduction	207
6.2 Characteristics of the industrial design studio	207
6.3 Further characteristics of the studio design process models of industrial/product design process	213
6.4 Research programme	218
6.5 Results and discussion	220
6.5a Summary	220
6.5b Findings: Methods and procedures used in industrial design, final-year projects:	220
6.5c Findings: Validation of the MPD Model and MPD System that links creative and systematic tasks within the major project:	223
6.5d Findings: Examination of tasks associated with major project execution and the extent to which structure and methods are included in project reports:	224
6.5e Findings: Complexity of projects: a) Investigation of the relative complexity of projects by application of the author's model that defines complexity: b) Complex projects and the extent to which these include a higher use of design methods	225
6.5f Findings: Academic performance: Investigation of designer Performance: a) by the established assessment process; b) external examination using criteria based on the MPD Model:	226
6.6 A summary of important findings in this research	227
6.7 Review of findings in relation to the original Research Propositions	228
6.8 Review of findings in relation to the original Aims	232
6.9 Recommendations for future research	233
<b>7.0 BIBLIOGRAPHY</b>	234
<b>8.0 GLOSSARY OF TERMS</b>	242
<b>9.0 APPENDICES:</b>	
<b>APPENDIX 1:</b> Survey of industrial design academics	250
<b>APPENDIX 2:</b> Survey questionnaire of 2003 projects	259
<b>APPENDIX 3:</b> Survey questionnaire of 2004 projects	266
<b>APPENDIX 4:</b> Examination to determine project tasks included in Project Research and Project	274

<b>APPENDIX 5:</b> Examination to determine the relative complexity of projects	275
<b>APPENDIX 6:</b> Participants information form	276
<b>APPENDIX 7:</b> Informed consent form	279
<b>APPENDIX 8:</b> Curriculum Vitae - R.S. White	280
<b>APPENDIX 9:</b> Structured survey - Management	283
<b>APPENDIX 10:</b> Structured survey - Conceptualisation	284
<b>APPENDIX 11:</b> Structured Survey - Resolution and presentation	285
<b>APPENDIX 12:</b> Structured Survey -Methods and process	286
<b>APPENDIX 13:</b> 2003 Cohort Survey - Question 9a) Methods and process used in major project	289
<b>APPENDIX 14:</b> 2003 Cohort Survey - Question 9b) Methods and process used in major project	291
<b>APPENDIX 15:</b> 2004 Cohort Survey - Question 9a) Methods and process used in major project	293
<b>APPENDIX 16:</b> 2004 Cohort Survey - Question 9b) Methods and process used in major project	295
<b>APPENDIX 17:</b> 2004 Cohort Survey - Question 9c) Methods and process used in major project	297
<b>APPENDIX 18:</b> Examination to determine project tasks included in Project Research and Project reports	299
<b>APPENDIX 19:</b> Examination to determine the relative complexity of projects	300
<b>APPENDIX 20:</b> 2004 Respondents: the extent to which the MPD System contributed to the stages of the 2004 cohorts major project	301
<b>APPENDIX 21:</b> 2003 Cohort Survey- Question 11, Do you feel a system of computer-integrated design methods would help.	302
<b>APPENDIX 22:</b> 2003 Cohort Survey- Question 11, Did you feel the computer-integrated design methods helped you	303
<b>APPENDIX 23:</b> 2003 Cohort Survey- Question 12, In what ways might computer-integrated design methods not help you	304
<b>APPENDIX 24:</b> 2004 Cohort Survey- Question 13. In what ways did the MPD System fail to help you	305
<b>APPENDIX 25:</b> Survey responses 2003 Cohort: Question 13	306
<b>APPENDIX 26:</b> Survey responses 2004 Cohort: Question 14	309
<b>APPENDIX 27:</b> Statistical correlations associated with 2003 cohort	311

<b>APPENDIX 28:</b> Statistical correlations associated with 2004 cohort	312
<b>APPENDIX 29:</b> 2003 Cohort Statistical Analysis (Q1 - Q8)	313
<b>APPENDIX 30:</b> 2004 Cohort statistical Analysis (Q1 - Q8)	314
<b>APPENDIX 31:</b> 2003 Cohort Statistical Analysis (examined theses)	315
<b>APPENDIX 32:</b> 2004 Cohort Statistical Analysis (examined theses)	316
<b>APPENDIX 33:</b> Statistical correlations associated with 2003 cohort (examined theses)	317
<b>APPENDIX 34:</b> Statistical correlations associated with 2004 cohort (examined theses)	318
<b>APPENDIX 35:</b> Statistical analysis of the 2003 examined reports	319
<b>APPENDIX 36:</b> Statistical analysis of the 2004 examined reports	320
<b>APPENDIX 37:</b> Normal distributions, 2003 cohort	321
<b>APPENDIX 38:</b> Normal distributions, 2004 cohort	324
<b>APPENDIX 39:</b> Assessment sheet, Project	328
<b>APPENDIX 40:</b> Assessment sheet, Project Research	329
<b>APPENDIX 41:</b> Published papers	330
Paper 1: The development of a suite of design methods appropriate for teaching product design	332
Paper 2: Studio-based teaching, history and advantages in the teaching of design	337
Paper 3: The importance of design methods to student industrial designers	341
<b>APPENDIX 42:</b> Analysis of the use of design methods over the first three phases of the MPD Model by the 2003 and 2004 cohorts	347
<b>APPENDIX 43:</b> Statistical analysis of task scores 2003 and 2004 cohorts, examined reports	348
<b>APPENDIX 44:</b> Statistical analysis of complexity scores 2003 and 2004 cohorts, examined reports	349
<b>APPENDIX 45:</b> Statistical analysis of Design Research versus Product Research, 2003 cohort	350
<b>APPENDIX 46:</b> Statistical analysis of Design Research versus Product Research, 2004 cohort	351
<b>APPENDIX 47:</b> MPD System, CD copy of file	352

## List of Tables

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Table 2-1	Course plan for Project Research (IDES4301) and Project (IDES4351)	32
Table 3-1	Bonollo and Lewis generic model of the design process	73
Table 3-2	Table of comparison of phases between the engineering and industrial design processes	74
Table 3-3	Generic model of the product development process	78
Table 3.4	Cross's design process, methods and aims	79
Table 3-5	Author's interpretation of Baxter's framework, suggested methods and aims	80
Table 3-6	Maffin's summary of the most commonly prescribed formal methods in relation to the product design stage	82
Table 3-7	Author's interpretation of the most commonly prescribed formal methods in relation to the product design stages	84
Table 3-8	Author's proposed summative model of the design process and applicable methods	85
Table 3-9	Proposed model of the Major Project Development Process	87
Table 3-10	The author's proposed suite of design methods aligned with the design process phase	89
Table 3-11	Author's proposed MPD Model to support the final-year industrial design project	91
Table 3-12	Author's proposed MPD Model including associated tasks and available methods	92
Table 3-13	Tasks associated with stages of the MPD Model	93
Table 3-14	Proposed model of Complexity assessment for final-year projects	108
Table 3-15	A worksheet that enables checking the issues of complexity in a project and the summation of a specific complexity score	109
Table 3-16	Arrangement of complexity issues to enable construction of an evaluation matrix	111
Table 4-1	Questionnaire section that considers issues associated with Management and Research.....	119
Table 4-2	Section from the Questionnaire allocated to considerations associated with Conceptualisation.....	120
Table 4-3	Section from the Questionnaire allocated to considerations associated with Resolution and Presentation	121
Table 4-4	Section from the Questionnaire allocated to considerations associated with Design Methods and Process	122
Table 4-5	Research propositions associated with Part 2 and Part 3	125
Table 4-6	Scoring for Question 1	127
Table 4-7	Question 11 (2004 cohort) asking to what extent the MPD System assisted in the major project.....	132
Table 4-8	Respective tasks associated with the phases of the MPD Model	137
Table 4-9	Indicating factors which describe the complexity of the project	138

Table 5-1	Demographics of academic respondents	143
Table 5-2	Demographic characteristics of academic respondents	144
Table 5-3	Demographics of the 2003 cohort respondents	145
Table 5-4	Summary, demographics, 2003 cohort	146
Table 5-5	Demographics of the 2004 respondents	148
Table 5-6	Summary, demographics, 2004 cohort	149
Table 5-7	Demographic comparison of the 2003 and 2004 cohorts	150
Table 5-8	Mean responses to questionnaire (management and research) by industrial design academics	152
Table 5-9	Mean responses to questionnaire (conceptualisation) by industrial design academics	153
Table 5-10	Mean responses to questionnaire (resolution and presentation) by industrial design academics	154
Table 5-11	Mean responses to questionnaire (design methods and process) by industrial design academics	157
Table 5-12	A summary of the highly utilised and not-applicable design methods	158
Table 5-13	Response to Questions 1-8 by the 2003 cohort	161
Table 5-14	A summary of the correlations between selected independent and dependent variables	162
Table 5-15	Portion of spreadsheet in Appendix 13 which shows raw data associated with Question 9a; the responses with respect to methods used in major project.	163
Table 5-16	A summary of responses to the use, in project work and in project reports, of a range of design methods by the 2003 cohort	164
Table 5-17	An overall summary of responses grouped into the stages of the MPD Model for the 2003 cohort.	166
Table 5-18	Response to Questions 1-8 by the 2004 cohort	167
Table 5-19	A summary of the correlations between selected independent and dependent variables	168
Table 5-20	A summary of responses to the use, in project work and in project reports, of a range of design methods by the 2004 cohort	169
Table 5-21	An overall summary of responses grouped into the stages of the MPD Model for the 2004 cohort.	171
Table 5-22	An overall comparison of the 2003 and 2004 cohorts in their use of specific design methods in the final-year projects	173
Table 5-23	The design methods with low utilisation (=50%) and high utilisation (>50%) used by the 2003 and 2004 cohorts.	175
Table 5-24	The opinions of the 2003 cohort of students as to their perception of the need for a more comprehensive, computer-integrated system of design methods than is currently available.	176
Table 5-25	The opinions of the 2004 cohort of students as to their perception of the need for a more comprehensive, computer-integrated system of design methods, namely the MPD System.	176

Table 5-26	Opinions of the 2004 cohort of students as to the extent that the MPD System contributed to the various defined stages of their major project.	177
Table 5-27	The opinions of the 2003 cohort with respect to the extent to which a comprehensive, computer-integrated selection of design methods might help in various areas of their project work.	178
Table 5-28	The opinions of the 2004 cohort with respect to the extent to which the MPD System helped in various areas of their project work.	178
Table 5-29	The opinions of the 2003 and 2004 cohorts with respect to the extent to which a comprehensive, computer-integrated selection of design methods might help in various areas of their project work.	178
Table 5-30	The opinions of the 2003 cohort with respect to the extent to which a comprehensive, computer-integrated selection of design methods might not help in areas of their project work.	179
Table 5-31	The opinions of the 2004 cohort with respect to the extent to which the MPD System did not help in various areas of their project work.	179
Table 5-32	Results from the study of 30 project reports from the 2003 cohort	184
Table 5-33	Results from the study of 30 project reports from the 2004 cohort	186
Table 5-34	A summary of the average results from the study of 30 major project reports from the 2003 and 2004 cohorts	187
Table 5-35	Results from the assessment of the 2003 Project Research and project reports with respect to their Complexity	189
Table 5-36	Results from the assessment of the 2004 Project Research and project reports with respect to their Complexity	192
Table 5-37	A summary of the results from the study of the relative complexity of 30 major project reports from the 2003 and 2004cohorts.	195
Table 5-38	Statistical tests associated with the 2003 cohort	197
Table 5-39	Statistical tests associated with the 2004 cohort	198
Table 5-40	Statistical tests associated with the examined reports of the 2003 cohort	199
Table 5-41	Statistical tests associated with the examined reports of the 2004 cohort	199
Table 5-42	A portion of Appendix 31 showing results of the examined reports	201
Table 5-43	Experimental evidence associated with the 2003 cohort's examined reports	202
Table 5-44	Experimental evidence associated with the 2004 cohort's examined reports	202

## List of Figures

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Figure 1.1	Diagram of the research plan	8
Figure 2.1	A typical design studio environment	10
Figure 2.2	Plato's School of Athens	13
Figure 2.3	The E'cole des Beaux Arts architectural studio in Paris	15
Figure 2.4	Stephenson's Rocket	18
Figure 2.5	Sewing machine, a typical example of mass production	19
Figure 2.6	The Bauhaus	21
Figure 2.7	The Pratt Institute, New York. Architectural design studio	23
Figure 2.8	A modern industrial design studio	25
Figure 2.9	UNSW industrial design studio	27
Figure 2.10	Diagrammatic representation of the Year 1 programme	28
Figure 2.11	Diagrammatic representation of the Year 2 programme	28
Figure 2.12	Diagrammatic representation of the Year 3 programme	29
Figure 2.13	An industrial design final-year exhibition	30
Figure 2.14	Diagrammatic representation of the Year 4 programme	31
Figure 2.15	Author's application of Kolb's mode of learning within the classroom and studio-learning situation	42
Figure 2.16	The scope of product design verses the engineering and industrial design domains	45
Figure 2.17	Darke's model of the design process	55
Figure 2.18	Simple model of the design process	56
Figure 2.19	The Markus / Maver design process	56
Figure 2.20	Basic design process employed in the studio	57
Figure 3.1	Tovey's dual-processing model incorporating left and right brain thinking modes	66
Figure 3.2	Simple model of solution verses evaluation	67
Figure 3.3	Simple model extended to include communication of the solution	68
Figure 3.4	Archer's design process model	69
Figure 3.5	Cross's seven stages of the design process positioned within the symmetrical problem-solution model	70
Figure 3.6	The consensus engineering design model	72
Figure 3.7	Eight-stage product development cycle	76
Figure 3.8	The menu page which lists the sections of the MPD system	95
Figure 3.9	The "Introduction page" presents a general introduction to the MPD System	96
Figure 3.10	A selected page showing the phases of the MPD System	97

Figure 3.11	The “Features Analysis” section of the MPD System	97
Figure 3.12	A spreadsheet example of the <i>features analysis</i> of a group of products	98
Figure 3.13	The “Benchmarking” section of the Product Planning phase	99
Figure 3.14	A spreadsheet-based example of Benchmarking	100
Figure 3.15	Author’s application of the MPD Model superimposed over left and right brain activities within the context of a major project	101
Figure 3.16	The four regions of the Design Difficulty versus resources plane	103
Figure 3.17	Concurrent engineering complexity assessment and evaluation matrix	105
Figure 3.18	Bar chart showing the assessed scores associated with the <i>Complexity</i> of 30 projects	110
Figure 3.19	An evaluation matrix of the dimensions of Product Research and Design Research	111
Figure 4.1	Four key sections of the questionnaire	118
Figure 4.2	Model for the experimental investigation of the relationships of the research variables	124
Figure 4.3	Two key sections of the questionnaire	126
Figure 5.1	Assessment of the tasks and structure included in the 2003 cohort reports	185
Figure 5.2	Assessment of the tasks and structure included in the 2004 cohort reports	187
Figure 5.3	Bar chart contrasting the scores associated with the assessment of tasks included in the 2003 and 2004 cohort reports	188
Figure 5.4	Bar chart showing the assessment of the 2003 Project Research and Project reports, with respect to Complexity, arranged in descending order	190
Figure 5.5	Complexity matrix for the 2003 cohort reports	191
Figure 5.6	Bar chart showing the assessment of the 2004 Project Research and Project reports, with respect to Complexity, arranged in descending order	193
Figure 5.7	Complexity matrix for the 2004 cohort reports	194
Figure 5.8	Bar chart showing the scores associated with the assessment of the Complexity of the 2003 and 2004 cohort reports	195
Figure 5.9	Matrix showing the thirty 2003 cohort projects contrasted with the thirty 2004 cohort projects	196
Figure 6.1	Authors application of the MPD Model superimposed over the left and right brain activities within the context of the major project	216

## Abbreviations and Symbols

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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