

An Analysis of Research Undertaken by Master of Computing Students

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Abstract

Master of Computing students at Unitec have to complete course work followed by a 60 credit dissertation or a 120 credit thesis. This paper contains an analysis of the research undertaken by 71 students who have completed to date, including their research areas and methods used for data collection and analysis.

Keywords: students, research, data collection, analysis

1 Introduction

The Master of Computing programme at Unitec commenced in 2000 and requires students to undertake four compulsory courses and three to seven elective courses plus a substantial piece of research supervised by two staff, at least one of whom is an experienced supervisor and at least one of whom has knowledge of the research area. The compulsory course titles are “The Impact of Information Technology on Society”, “Managing Information Technology Projects”, “Information Technology and Strategic Planning” and “Research Methods”. The elective courses cover the areas of Business, Educational Technology, Multimedia, Networks and the Internet (see Joyce, 2006).

At the time of writing 49 students had completed a dissertation (worth 60 credits, equivalent to a semester’s full time work) and 22 students had completed a thesis (worth 120 credits, equivalent to a year’s full time work). In this paper an analysis of their research areas and methodologies is presented, and differences (between dissertations and theses, and between groups of students) are highlighted.

2 Computing Research Methods

A great variety of methods are used in computing research, ranging from quantitative methods like experiments and hypothesis testing to qualitative methods like action research and grounded theory. Vessey, Ramesh, and Glass (2001) proposed “a unified classification system for research in the computing disciplines” and went on to write papers focused on software engineering (Glass, Vessey, & Ramesh, 2002) and computer science (Ramesh, Glass, & Vessey, 2004).

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They tested their classification system on a large set of papers and settled on 19 categories (Glass, Ramesh, & Vessey, 2004).

Holz et al. (2006) listed 54 distinct methods used in computing research and provided a glossary of 100 related terms. They also introduced a framework involving four questions: “What do you want to achieve?” “Where does the data come from?” “What will you do with the data?” “Have you achieved your goal?” In this paper the focus is on the second and third questions.

3 Overall Analysis

Table 1 shows the numbers of students researching in the different areas and the methods they used for data collection and analysis. Data collection methods are categorised as Extraction (E), Focus Group (F), Interview (I), Questionnaire (Q) or Experiment (X). Data analysis methods are categorised as Descriptive Statistics (D), Qualitative (L) or Statistical Tests (S).

Table 1: Research Areas & Methodologies

Area	No.	Data Collection	Data Analysis
Business Systems	16	3EI,1EQ,3I,7IQ,2Q	1D,9DL,1DS,5L
Ecommerce	17	1E,4EI,2EQ,4I,3IQ,3Q	3D,6DL,2DS,6L
Educational Software	6	1EI,1FI,1I,2IQ,1Q	2DL,1DS,2L,1LS
Elearning	8	1E,1EQ,1I,3IQ,1QX,1X	1D,5DL,2L
Hardware	2	2Q	1DL,1L
Internet	5	1E,2EI,1I,1IQ	1D,2DL,2L
Networks	9	1E,1EI,1EQ,4IQ,2X	2D,6DL,1L
Operating Systems	1	1Q	1DL
Software	5	1I,1IQ,3Q	3DL,2L
User Support	2	2Q	2DL
All Areas	71	4E,11EI,5EQ,1FI,11I,21IQ,14Q,1QX,3X	8D,37DL,4DS,21L,1LS

3.1 Research Areas

The most popular research areas were Business Systems and Ecommerce, which together accounted nearly half of the dissertations and theses (33). Nearly a fifth of the research topics (14) were concerned with Educational

Software or Elearning. More than a sixth (12) related to the Internet, Software or User Support. The same number involved the more technical areas of Hardware, Networks and Operating Systems. The balance of research areas has changed little in the last four years (see Joyce & Young, 2004).

3.2 Data Collection Methods

The most common data collection methods were interviews (used by 44 students) and questionnaires (used by 41 students). More than a quarter of the students (20) extracted information from pre-existing data, such as accumulated emails, company documents, and sales records. Four students conducted experiments and only one student used a focus group. More than half of the students (39) used two data collection methods, with interviews and questionnaires being the most popular combination.

3.3 Data Analysis Methods

The great majority of students (59 out of 71) had qualitative data to analyse and used techniques like content analysis and thematic analysis to highlight patterns in their data (a few used Nvivo software). More than two-thirds (49) used descriptive statistics to analyse and present their quantitative data. More than half of the students (38) had collected both qualitative and quantitative data and employed mixed methods. Only five students conducted statistical tests on their data.

4 Analysis of Dissertations

Table 2 shows the numbers of dissertation students researching in the different areas and the methods they used for data collection and analysis.

Table 2: Dissertation Research Areas & Methodologies

Area	No.	Data Collection	Data Analysis
Business Systems	12	2EI,1EQ,2I,5IQ,2Q	1D,5DL,1DS,5L
Ecommerce	14	1E,3EI,2EQ,2I,3IQ,3Q	3D,5DL,2DS,4L
Educational Software	2	1FI,1I	1DL,1L
Elearning	3	1E,1I,1IQ	1D,1DL,1L
Hardware	2	2Q	1DL,1L
Internet	4	1E,1EI,1I,1IQ	1D,2DL,1L
Networks	8	1E,1EI,1EQ,4IQ,1X	1D,6DL,1L
Software	4	1I,1IQ,2Q	2DL,2L
All Areas	49	4E,7EI,4EQ,1FI,8I,15IQ,9Q,1X	7D,23DL,3DS,16L

4.1 Research Areas

The most popular research areas were Business Systems and Ecommerce, which together accounted for more than half of the dissertations (26). More than a fifth of the research topics (10) involved the more technical areas of Hardware and Networks. Only small numbers of students

researched Educational Software, Elearning, the Internet or Software.

4.2 Data Collection Methods

The most common data collection methods used for dissertations were interviews (used by 31 students) and questionnaires (used by 28 students). Nearly a third of the students (15) extracted information from pre-existing data, such as accumulated emails, company documents, and sales records. One student conducted an experiment and one student used a focus group. More than half of the students (27) used two data collection methods, with interviews and questionnaires being the most popular combination.

4.3 Data Analysis Methods

The great majority of dissertation students (39 out of 49) had qualitative data to analyse and used techniques like content analysis and thematic analysis to draw out patterns from their data. Nearly as many (33) used descriptive statistics to analyse and present their quantitative data. Nearly half of the students (23) had collected both qualitative and quantitative data and employed mixed methods. Only three students conducted statistical tests on their data.

5 Analysis of Theses

Table 3 shows the numbers of thesis students researching in the different areas and the methods they used for data collection and analysis.

Table 3: Thesis Research Areas & Methodologies

Area	No.	Data Collection	Data Analysis
Business Systems	4	1EI,1I,2IQ	4DL
Ecommerce	3	1EI,2I	1DL,2L
Educational Software	4	1EI,2IQ,1Q	1DL,1DS,1L,1LS
Elearning	5	1EQ,2IQ,1QX,1X	4DL,1L
Internet	1	1EI	1L
Networks	1	1X	1D
Operating Systems	1	1Q	1DL
Software	1	1Q	1DL
User Support	2	2Q	2DL
All Areas	22	4EI,1EQ,3I,6IQ,5Q,1QX,2X	1D,14DL,1DS,5L,1LS

5.1 Research Areas

The most popular research areas were Business Systems, Ecommerce, Educational Software and Elearning, which together accounted for nearly three-quarters of the theses (16). The other four areas were researched by only one or

two students each. Much higher proportions of thesis students than dissertation students researched Educational Software or Elearning, but lower proportions of thesis students researched Business Systems or Ecommerce.

5.2 Data Collection Methods

The most common data collection methods used for these were interviews and questionnaires (each used by 13 students). Five students extracted information from pre-existing data, such as accumulated emails, company or school documents, and sales records, and three students conducted experiments. More than half of the students (12) used two data collection methods, with interviews and questionnaires being the most popular combination. A much higher proportion of thesis students than dissertation students conducted experiments, but lower proportions of thesis students used pre-existing data. Similar proportions of dissertation and thesis students used interviews or two methods.

5.3 Data Analysis Methods

The great majority of thesis students (20 out of 22) had qualitative data to analyse and used techniques like content analysis and thematic analysis to draw out patterns from their data. Nearly three-quarters of the students (16) used descriptive statistics to analyse and present their quantitative data. More than two-thirds of the students (15) had collected both qualitative and quantitative data and employed mixed methods. Only two students conducted statistical tests. Higher proportions of thesis students than dissertation students used qualitative analysis or mixed methods.

6 Analysis by Gender and First Language

Table 4 shows the numbers of students researching in the different areas, broken down by gender (where f = female, m = male) and first language or language group (where Chi = Chinese, Eng = English, Ger = German, Ind = Indian, Nor = Norwegian).

6.1 Gender

Men were much more likely to undertake dissertations (39) than theses (13), whereas for women the numbers were nearly equal (10 dissertations and 9 theses). If we ignore areas with fewer than five students, we find that men were under-represented in the area of Business Systems and over-represented in the area of Networks. Conversely, women were over-represented in the area of Business Systems and under-represented in the area of Networks. Only men researched Hardware, Operating Systems or Software and only women researched User Support.

Area	Gender	Chi	Eng	Ger	Ind	Nor	Other
Business Systems	6f, 10m	4	1	7	1	2	1
Ecommerce	5f, 12m	1	3	5	1	5	2
Educational Software	1f, 5m		4		2		
Elearning	3f, 5m		7		1		
Hardware	2m	1		1			
Internet	1f, 4m		3	1			1
Networks	1f, 8m	3		1	4	1	
Operating Systems	1m				1		
Software	5m		1	2	1		1
User Support	2f		2				
Number	19f, 52m	9	21	17	11	8	5

6.2 First Language

Students with English as their first language were much more likely to undertake theses (13 out of 21) than the other students (9 out of 50). If we ignore areas with fewer than five students, we find that Chinese students were over-represented in the areas of Business Systems and Networks, and under-represented in the areas of Ecommerce and Elearning. Similarly students with English as their first language were over-represented in the areas of Educational Software, Elearning and Internet, and under-represented in the areas of Business Systems, Ecommerce and Networks. German students were over-represented in the area of Business Systems, and under-represented in the areas of Educational Software, Elearning and Networks. Students from the Indian sub-continent were over-represented in the areas of Educational Software and Networks, and under-represented in the areas of Business Systems and Ecommerce. Norwegian students were over-represented in the area of Ecommerce.

7 Conclusions

Significant differences in terms of gender and language have been identified in students' choices (between dissertation and thesis, and among research areas). Choice of research area is usually influenced by the student's background and experience. For instance, the predominance of Business Systems and Ecommerce is partly explained by the fact that a quarter of the students came to Unitec from the European Business School. A similar number of students are working in the tertiary education sector and many of them chose to conduct research in the areas of Educational Software and Elearning.

Given that Holz et al. (2006) list more than 50 methods used in computing research, it appears that Unitec's Master of Computing students have chosen to focus on a limited range of methods. Most used interviews and/or

Table 4: Analysis by Gender & First Language

questionnaires to collect their data and techniques like content analysis, thematic analysis and descriptive statistics to analyse their data. Very few students have used statistical tests or conducted experiments, which may indicate lack of confidence and/or experience with “scientific” methods. It is also possible that for some students, the choice of methods was influenced by external factors such as their supervisor’s preferences, the need to obtain ethical approval promptly and the limited time available for completing the research.

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