PROFESSIONAL WORK EXPERIENCES OF RECENT AUSTRALIAN INFORMATION TECHNOLOGY GRADUATES

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not been previously submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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ABSTRACT

There is an increasing expectation amongst students and employers in professional fields such as Information Technology (IT) that university studies will provide sufficient skills to enable graduates to find employment in the industry. However, little research, particularly in the IT field, has been carried out in following graduates into their professional practice. The professional work experiences of recent Australian IT graduates are the focus of this thesis. Professional work experiences are defined in this thesis as the parts of a graduate's work that cover professional or non-technical skills such as communication, teamwork etc. In the IT education literature, there are a number of studies on IT technical skills but few on the non-technical aspects of professional work and those studies focus on the employers' viewpoints. IT graduates' viewpoints on the challenges they face at work, the typical professional skills requirements of their practice and how they acquired or developed them, the elements of their university study that are relevant to their work professional skills requirements and how well their studies prepared them to meet the professional needs of their practice are investigated in this study. An understanding of what the professional work experiences of recent Information Technology graduates in professional practice tell us about their university studies is sought by this thesis. Then the role of universities, employers, professional associations and graduates themselves in the professional preparation of IT graduates are examined.

Some key ideas from grounded theory (theoretical sampling, constant comparison, theoretical saturation, open coding, axial coding and selective coding) are used for data collection and analysis. Interviews and qualitative online surveys are the research methods used to capture recent Australian IT graduates' professional work experiences.

It is shown in this research that IT graduates face a number of challenges when they first enter employment. Major categories of professional skills that IT graduates believe they require for their work are communication, time management, teamwork, working with people, working across cultures, project management, business skills and personal attributes. The study found that graduates' professional skills are developed in multiple ways including academic, social, personal, professional and other work experiences or a combination of these. IT graduates in the study believe the most useful components of their

university studies are work placements and “real life like” projects. The perceived lack of preparation of IT graduates to face new, unfamiliar, unknown or unknowable situations is highlighted by the study. The findings demonstrate the complexity involved in the development of professional skills, how and where they are developed and who (university or employers or graduates) assumes responsibility for their development. Other findings suggest that some professional skills can be developed only outside the university studies.

Accordingly, it is argued in this thesis that the development of professional skills is a distributed responsibility and different players (professional faculties, employers, professional associations and graduates) have different contributions to make to the development of these skills. It is proposed that universities cannot be solely responsible for developing work ready IT graduates. It is suggested that universities take responsibility for preparing graduates to learn how to learn in uncertain situations, assisting with the graduates’ development of knowledge and awareness of work environments and helping in the graduates’ development of initial job expectations. It is argued that IT faculties need frameworks beyond graduate attributes in their degrees for the development and inclusion of specific professional skills for the IT profession; Employers should move away from thinking that adding topics to the IT curriculum would solve all their concerns about the lack of professional work skills in IT graduates and it is suggested that they take responsibility for training graduates when they commence work, facilitating workplace learning, increasing workplace socialisation and working with universities to provide work placement opportunities for students. It is urged that graduates to take personal responsibility for developing their professional skills both within and outside university studies. It is proposed that professional associations take responsibility for increasing IT students’ exposure to the IT industry through scholarships, research and job ready programs.

Given the results of this research and its recommendations, there is a need to raise the issue of the management of expectations of employers, universities and graduates of each other. It is clear that these may need to change before employer and academic concerns about skills of new IT graduates can be addressed.

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LIST OF ACRONYMS/ABBREVIATIONS

ALTC	Australian Learning and Teaching Council
ABET	Accreditation Board for Engineering and Technology (USA)
ACDICT	Australian Council of Deans for Information and Communication Technology
ACM	Association of Computing Machinery
ACS	Australian Computer Society
ACS CPEP	Australian Computer Society Computer Profession Education Program
ACS F	Australian Computer Society Foundation
AIIA	Australian Information Industry Association
AQF	Australian Qualifications Framework
AUTC	Australian Universities Teaching Committee
CBOK	Core Body of Knowledge
CC1991	Computing Curricula 1991
CC2001	Computing Curricula 2001
DEEWR	Department of Education, Employment and Workplace Relations
DETYA	Department of Training and Youth Affairs
HECS	Higher Education Contributory Scheme
GSA	Graduate Skills Assessment
GPS	Graduate Pathways Survey
ICT	Information and Communications Technology
ICT-Ed	ICT Education
IEEE	Institute of Electrical and Electronics Engineers
IEEE-CS	Computer Society of the Institute of Electrical and Electronics Engineers
IT	Information Technology
IS	Information Systems
MIS	Management Information Systems
NBN	National Broadband Network
SFIA	Skills Framework for Information Age
SIGITE	Special Interest Group for Information Technology Education
SME	Small to Medium Enterprises
SWOT	Strengths Weakness Opportunities and Threats
WWW	World Wide Web

GLOSSARY

Some terms commonly used in this thesis are defined in this Section.

Axial coding: Crosscutting (series of interlinking) or relating concepts to each other. (Corbin and Strauss, 2008)

Categories: High-level concepts under which analysts group lower level concepts according to shared properties (Corbin and Strauss, 2008). In this research, a *major category* is comprised of one or more *low level 1 categories*. A *Low level 1 category* is comprised of one or more *low level 2 categories*.

Coding: Deriving and developing concepts from data (Corbin and Strauss, 2008)

Concepts: Words that stand for groups or classes of objects, events and actions that share some major common property(ies) though the property(ies) can vary dimensionally (Corbin and Strauss, 2008)

Constant comparison: The analytic process of comparing different pieces of data for similarities and differences (Corbin and Strauss, 2008)

Core category: A representation of the main theme of the research. It is the concept all other concepts will be related to. (Corbin and Strauss, 2008)

Data analysis: The examination of a substance (or system) and its components in order to determine their properties and functions, then the use of the acquired knowledge to make inferences about the whole. (Corbin and Strauss, 2008)

Deductive analysis: An analytic approach that uses a framework created and decided before the investigation (Reid, 2006)

Diagrams: Visual devices that depict relationships between analytic concepts (Corbin and Strauss, 2008)

Dimensions: Variations within properties that give specificity and range to concepts (Corbin and Strauss, 2008)

Employability Skills: Skills required not only to gain employment but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions (Business Council of Australia (BCA) and Australian Chamber of Commerce and Industry (ACCI), 2002)

Forcing: Act of forcing pre-existing or pre conceived ideas on the data by looking for evidence to support established ideas (Glaser and Strauss, 1967).

Generic skills: Non-technical skills such as communication skills, time management skills, teamwork skills, etc.. Also referred to as soft skills or non-technical skills, graduate attributes.

Grounded theory: A specific methodology developed by Glaser and Strauss (1967) for the purpose of building theory from data. (Corbin and Strauss, 2008)

Grounded theory (as defined by Glaser) "*Grounded theory* data analysis is the "generation of emergent conceptualisations into integrated patterns, which are denoted by categories and their properties ….. woven together by the constant comparison process which is designed to generate concepts from all the data" (Glaser, 2002 p. 1)

Grounded theory (as defined by Strauss and Corbin) ".....inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis and theory stand in reciprocal relationship with each other." (Strauss and Corbin, 1990)

Inductive analysis: An analytic approach where theory is generated from observations (Reid, 2006)

Memos: Written records of analysis (Corbin and Strauss, 2008)

Open coding: The breaking apart of data and then the delineation of concepts to stand for (or represent) blocks of raw data (Corbin and Strauss, 2008)

Phenomena: Ideas that emerge from data that answer the question "What is going on here?" (Corbin and Strauss, 2008)

Professional skills: Professional skills refer to skills such as communication, teamwork, etc., i.e. non-technical skills.

Professional work experiences: Professional work experiences are non-technical work experiences that include all parts of graduates' work that does not involve specific Information Technology activities. Experiences directly linked with Information Technology work activities may include tasks such as programming, database administration, computer security, systems analysis and design, etc. A non-technical experience includes tasks such as communicating ideas and information, working with others and in teams, etc.

Properties: Characteristics that define and describe concepts (Corbin and Strauss, 2008)

Sandwich courses: Sandwich degree courses offer six months or a year of work placement (with an employer in the relevant field of study).

Saturation: Saturation occurs when no new data are emerging from analysis. It also denotes the development of categories in terms of their properties and dimensions, including variation, and, if theory building, the delineating of relationships between concepts. (Corbin and Strauss, 2008)

Selective coding: The process of establishing links between the core category and other categories, integrating categories along the dimensional level to form a theory and validating the statements of relationship among concepts (Strauss and Corbin, 1998)

Theme: The common meaning or an idea that runs through most of the data or a minority idea that captures a particular emotion or factual idea.

Theoretical coding: The process of conceptualising how categories and properties may relate to each other as hypotheses to be integrated into a theory (Glaser, 1978)

Theoretical sampling: Data collection based on concepts that appear to be relevant to the evolving story line or sampling based on the basis of concepts derived from data (Corbin and Strauss, 2008)

Theoretical saturation: The point in analysis when all categories are well developed in terms of properties, dimensions and variations. Further data gathering and analysis adds little new to the conceptualisation, though variations can always be discovered. (Corbin and Strauss, 2008)

Theoretical sensitivity: The ability to pick up on subtle nuances and cues in the data that infer or point to something (Corbin and Strauss, 2008)

Work integrated learning: According to Patrick et al. (2009), work integrated learning includes a "range of approaches and strategies that integrate theory with the practice of work within a purposefully designed curriculum". The ACDICT and ACS industry forum (2010) states that the main purpose of work integrated learning is to include professional experience, employability and job ready skills for all ICT students using a combination of external models (industry-based work experiences such as placements and internships) and internal models (university-based experiences such as project work, case studies and simulated or virtual opportunities).

Work ready skills: Work ready skills include communication, ethics and professionalism, global and local perspectives, information literacy and management, initiative, enterprise and creativity, planning and organising, problem solving and critical thinking, research, self-management and life-long learning, teamwork and leadership and technology literacy (Litchfield and Nettleton, 2008)